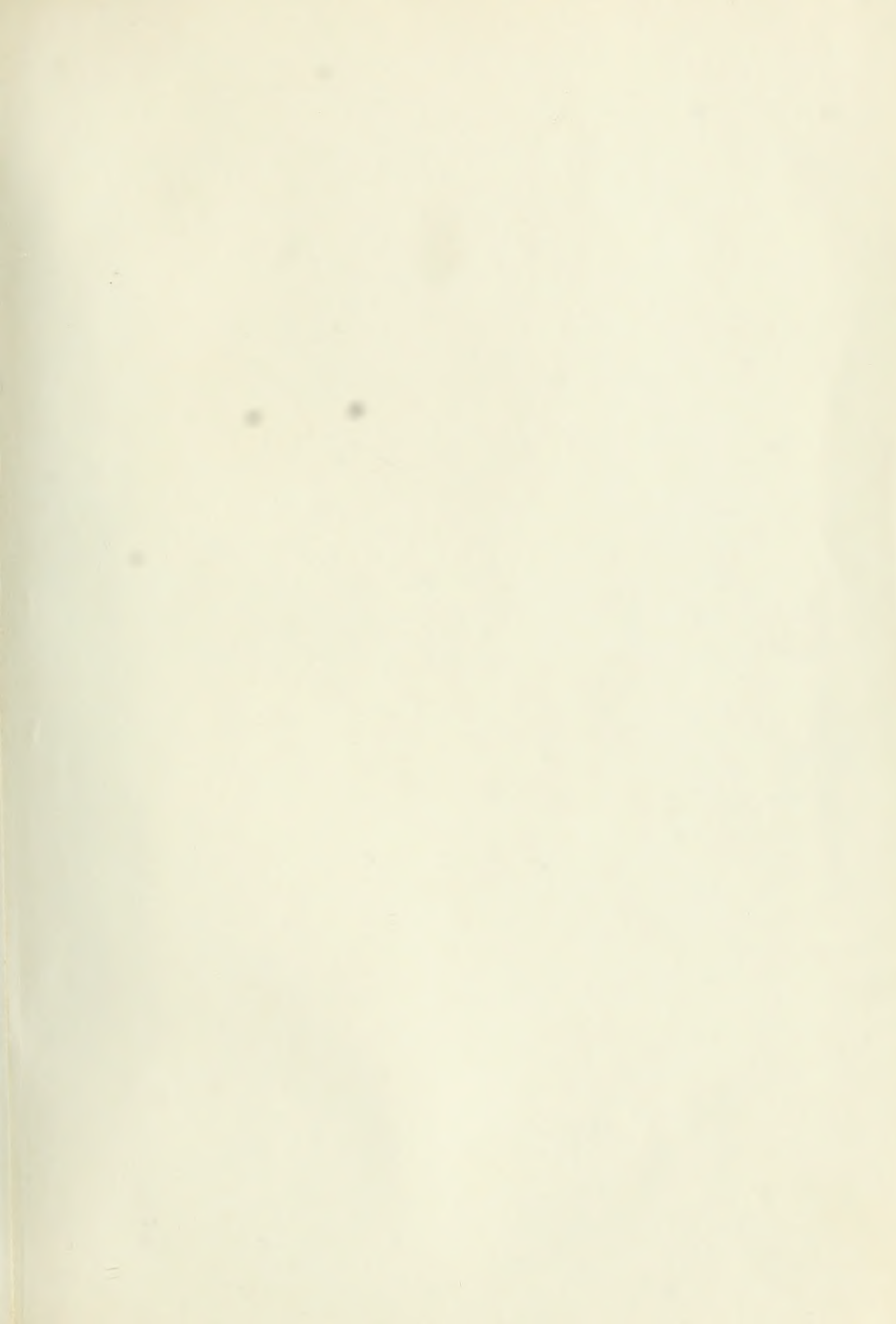
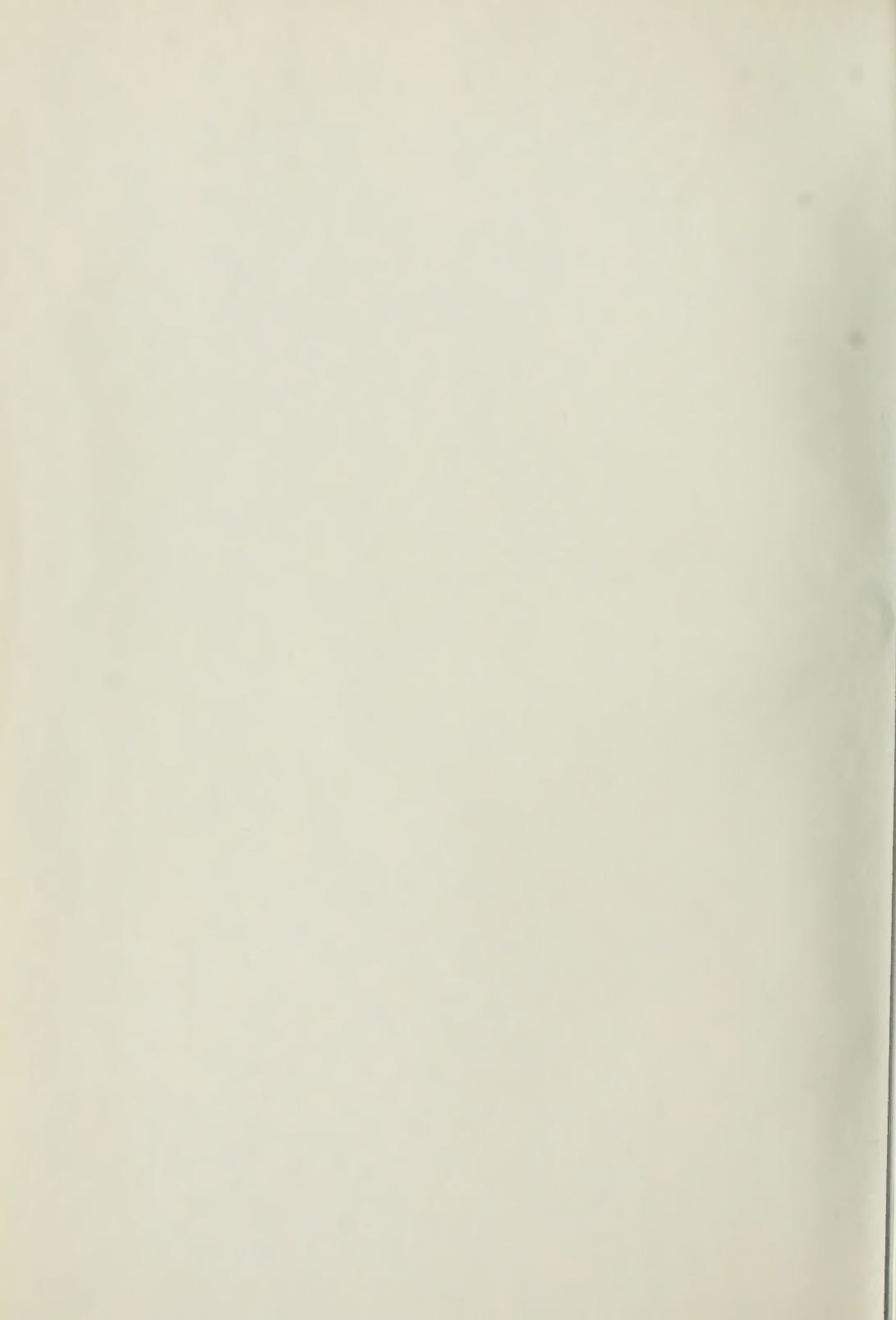
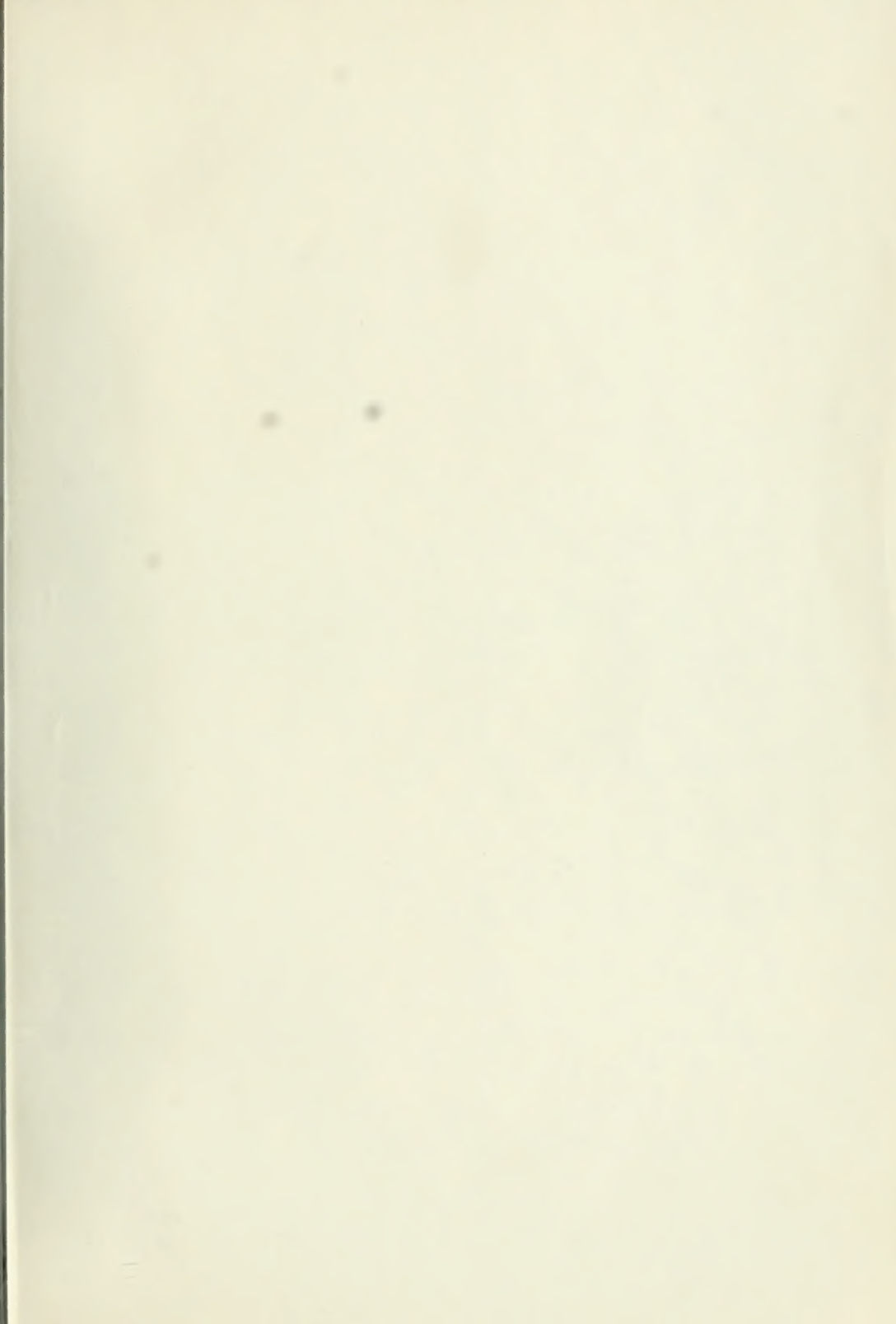
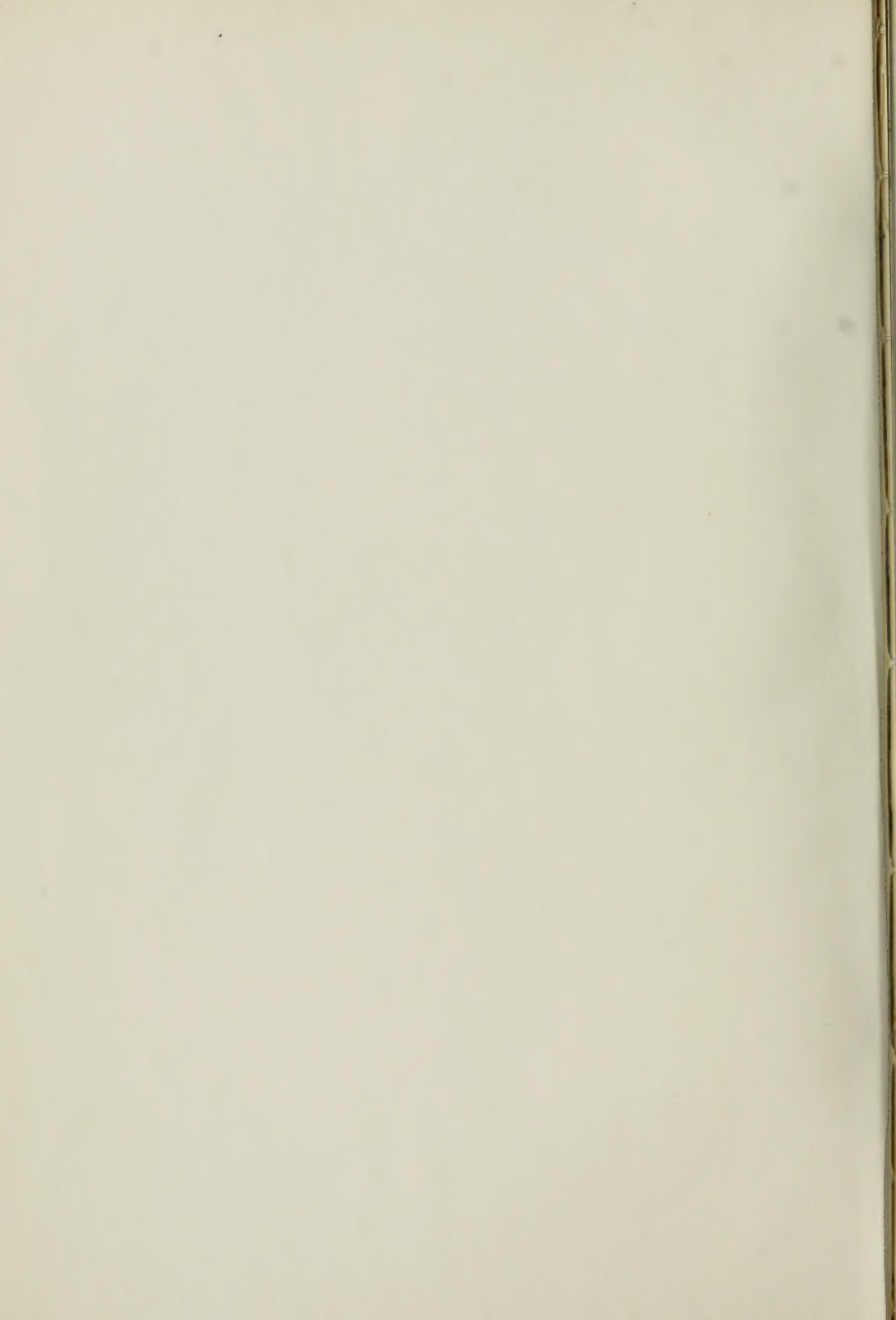


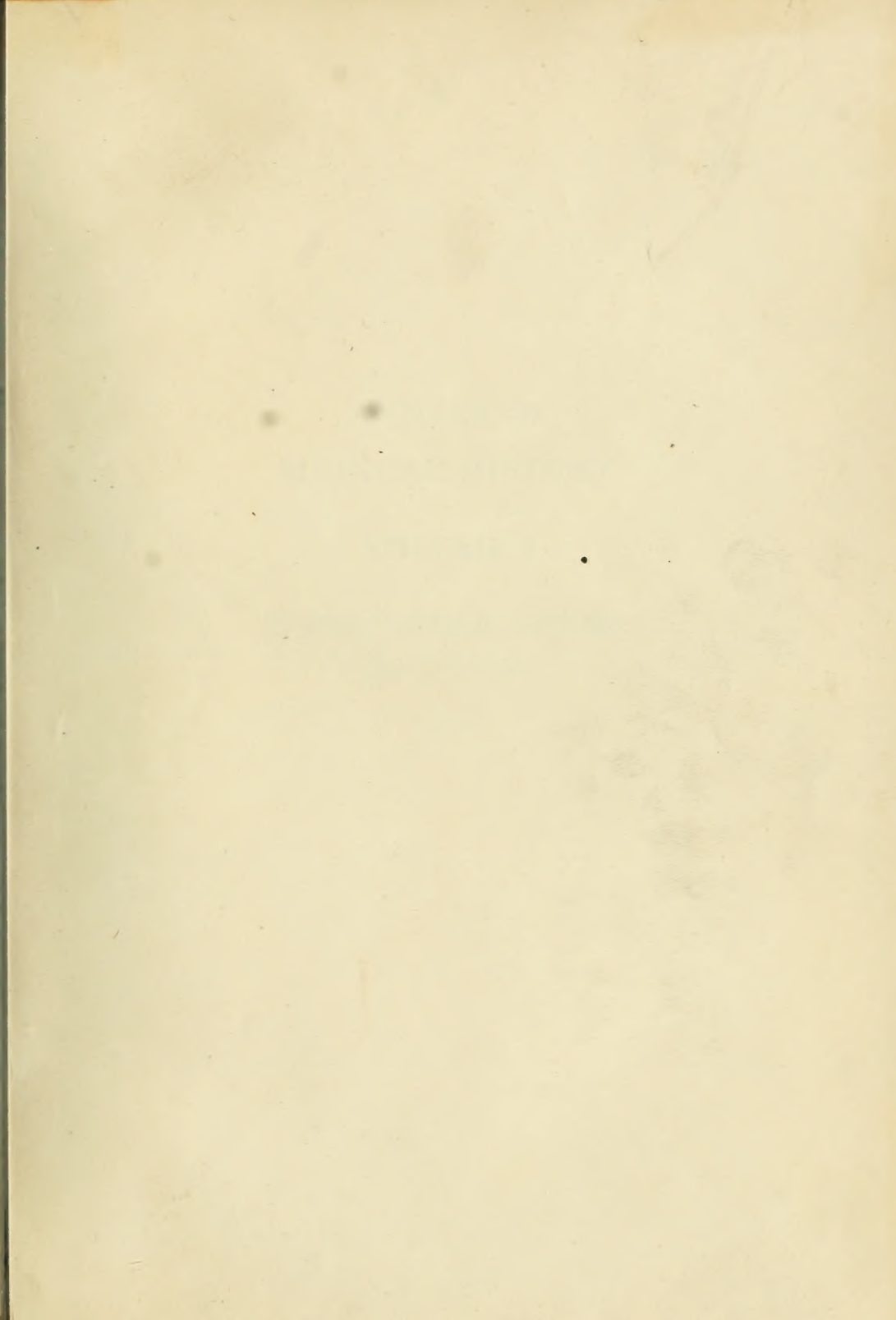
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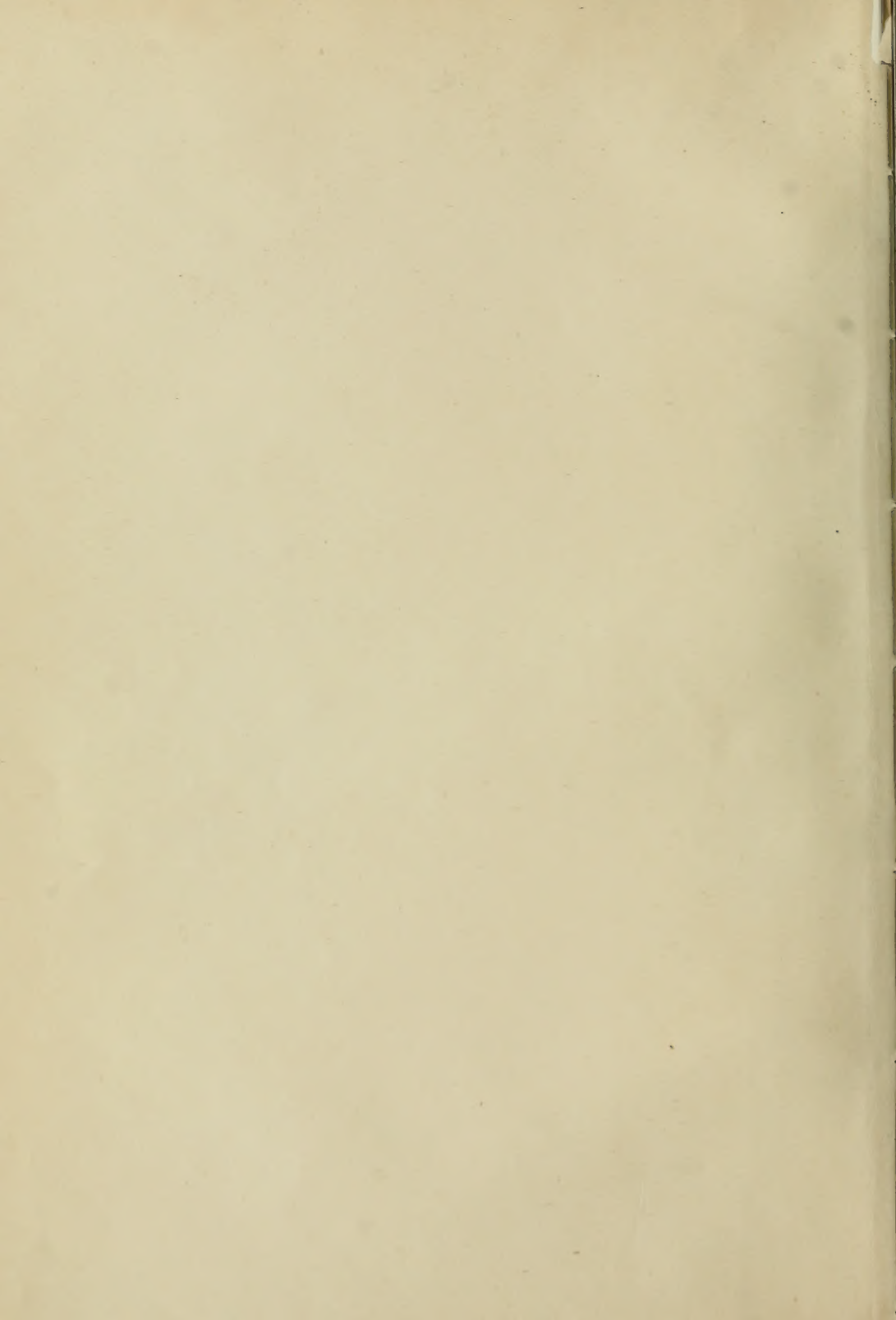












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SPRING, SUMMER, AUTUMN
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1917

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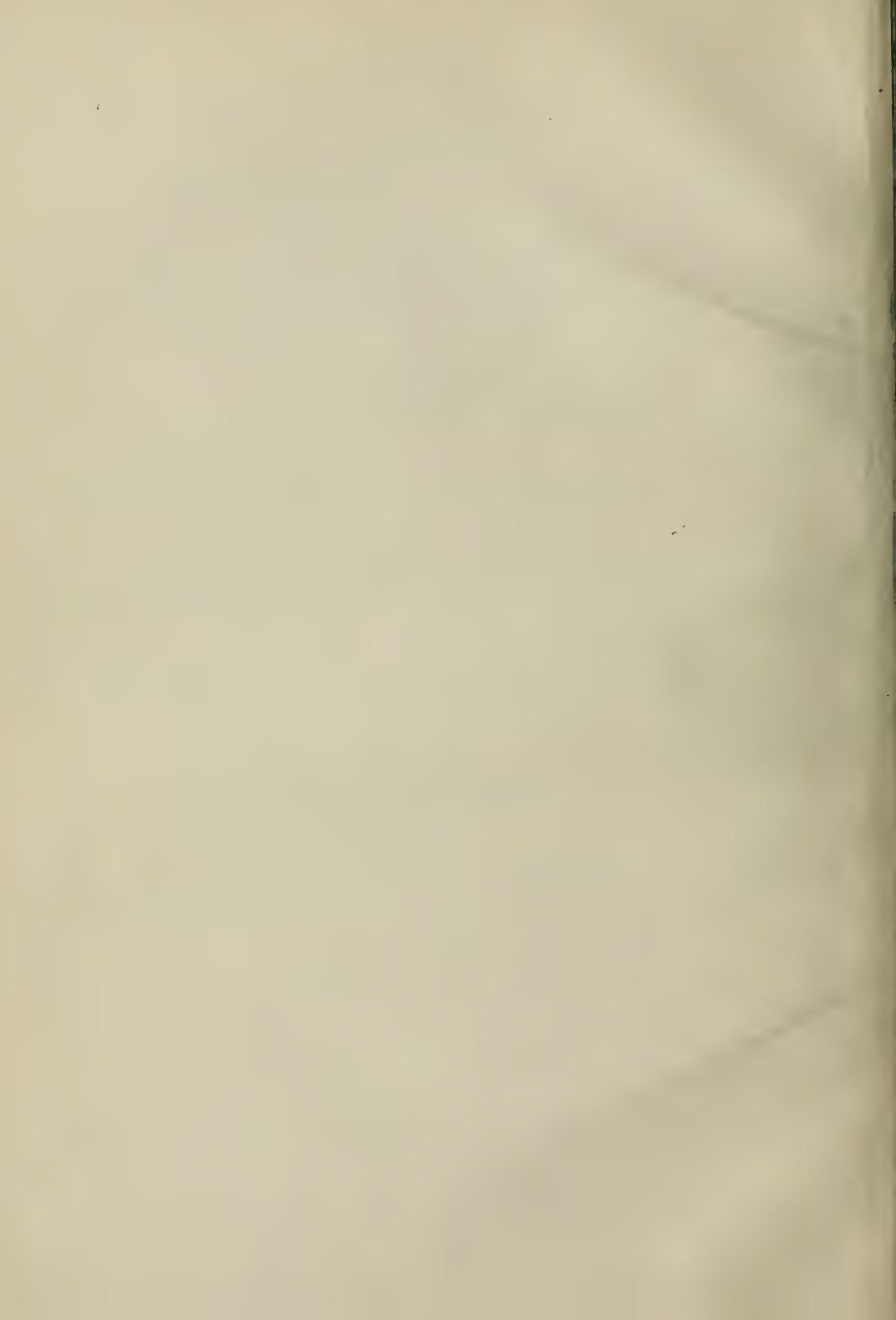
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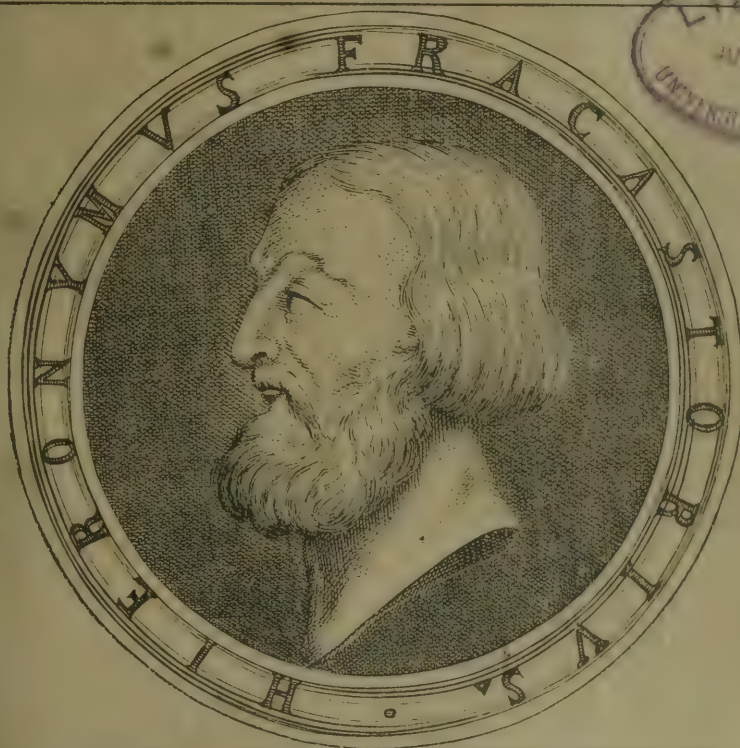


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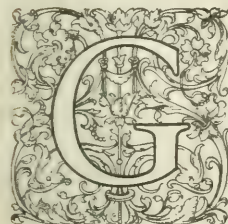
NUMBER I

THE SCIENTIFIC POSITION OF GIROLAMO FRACASTORO [1478?-1553]

WITH ESPECIAL REFERENCE TO THE SOURCE, CHARACTER
AND INFLUENCE OF HIS THEORY OF INFECTION

By CHARLES AND DOROTHEA SINGER

OXFORD, ENGLAND



GIROLAMO FRACASTORO was born in Verona in 1478¹ and he died in his villa near that city in 1553. He came of an honorable stock which had produced many distinguished physicians. Of one of these, Aventino Fracastoro, who was practising medicine as early as 1325 we read that he was *medica clarissimus arte, astra poli novit novitque latencia rerum, utile consilium civibus et dominis*.²

I. THE CHARACTER AND WRITINGS OF FRACASTOR

The subject of our study, Girolamo Fracastoro, was himself brought up in what

¹ The date usually given for Fracastor's birth is 1483. Reasons for referring the event to 1478 are given by Professor Roberto Massalongo in his "Girolamo Fracastoro e la rinascenza della medicina

has been called the "academic" period of the Renaissance and received the most complete education available in his day. In his youth he attended the University of Padua, where he had a number of brilliant associates, several of whom exercised considerable influence upon him. Among them were Gaspare Contarini (1483-1542) who later, as cardinal, sought, at the diet of Ratisbon, to effect a reconciliation between Catholics and Protestants; Giambattista Rhamnusio (1485-1557), the Italian Hakluyt, who inscribed to Fracastoro his great *Viaggi et Navigazioni*;³ the fine scholar Andrea Navagero (1483-1529) to whom Teobaldo Manucci dedicated the *editio princeps* of Pindar⁴ and who himself edited for the Aldine press the works of Quintilian, Virgil, Lucretius, Ovid, Terence, Horace and the

in Italia," Venice, 1915, p. 20. If Massalongo is right Fracastor must have been rather older than most students when he attended the University.

² Giuseppe Biadego, "Medici veronesi e una

Speeches of Cicero; and three distinguished brethren, townsmen of Fracastoro, whose father, Girolamo Della Torre, a learned physician, perhaps determined the student's application to his own profession, while one of the sons, who died at an early age, stimulated Fracastor to embark on his astronomical research.

Among such companions Fracastor early developed facility as a writer of elegant verse, and although to a later generation the enthusiasm with which his effusions were greeted may appear excessive, he yet gained through their composition a clearness of style which is not the smallest of his excellencies as a scientific writer. But there was another fellow student of Fracastor for whom was reserved a destiny far greater than that of any whom we have named. The young Pole, Nicolaus Koppelnigk (1473-1543), had already spent several years in the study of Law at Bologna,⁵ when in 1501 he entered his name as a student of medicine at Padua. Copernicus remained in the medical school for some four years, and from that period dates his dissatisfaction with the Ptolemaic doctrine of a geocentric Universe. Fracastor was himself a keen critic of Ptolemy's teaching, and it seems more than probable that the two young men had exchanged ideas during the period when they must often have sat side by side in the lecture rooms at Padua.⁶ During the later part of the sojourn of Copernicus in Padua, Fracastor was appointed tutor in anatomy (*conciliarius anatomicus*) and the Polish student, who was nevertheless the older of the two, must have attended his former classmate's demonstrations.⁷

libreria medica del sec. XIV" in the *Atti del reale istituto veneto di scienze, lettere ed arti* LXXV, parte seconda 5723, Venice, 1916.

⁵ Giambattista Rhamnusio, "Viaggi et navigationi," Venice, 1550.

⁶ Aldus Manutius: "Pindar," Venice, 1513.

⁷ Carlo Malagola, "Niccolò Copernico nello studio

Perhaps the deepest impression on Fracastor's mind in these formative days was made by the conflict between the opposing schools of Aristotelians that divided the University during the early years of the sixteenth century. The two protagonists were the Bolognese anatomist Alessandro Achillini (1463-1518), who had left his own University to profess a form of Averroism at Padua, and Pietro Pomponazzi (1462-1525), also a physician, who inclined to the interpretation of Alexander Aphrodisias and whose even more heterodox teaching ultimately led to his emigration in the reverse direction from Padua to Bologna. Though he is said to have been incapable of interpreting Aristotle to his hearers from the original Greek, Pomponazzi was yet a very spirited and original teacher, of great independence of thought. He was wholly divorced from the religion of his day and he died repudiating the hope of Christianity.

But Pomponazzi represents a movement of far more importance than any mere school of Aristotelian interpretation. He stands for *Naturalism*, for the attempt to explain the World and all that it contains on the basis of known or discoverable laws. That many of the laws considered by him as demonstrated now seem absurdities, that on insufficient evidence he regarded certain earthly events as related to the movements of the heavenly bodies with the same assurance that we now ascribe them to climatic or meteorological conditions, these are errors in the application of his method that need not affect our judgment of the importance of his philosophical position.

Thus Pomponazzi stood for the reign of di Bologna" in "Monografie storiche sullo studio Bolognese," Bologna, 1888.

⁶ In the dedication of the "De revolutionibus" to the Pope (1542) Copernicus says that it is now "four nines of years" since the heliocentric system was conceived. This brings its birth at least as far back as 1506, and he did not leave Padua till 1505.

⁷ Antonio Favaro, "Lo studio di Padova al tempo

natural law as does Fracastor, his assiduous pupil, although the latter became in certain other respects the opponent of his teacher.⁸ Fracastor was himself, however, constitutionally incapable of the controversial attitude of Pomponazzi. In the serene detachment of his humanism he exhibited no opposition, either open or concealed, to the current of Christianity, nor did he shun the company of clerics. But the churchmen that Fracastor made his associates were of the class, common enough in the early sixteenth century, in whom Catholic tradition was almost entirely displaced by the prevailing literary paganism. His friend, Cardinal Pietro Bembo, the recipient of the poem "Syphilis" and the lover of Lucrezia Borgia, was also a pupil of Pomponazzi, and was hardly more influenced by Christianity than his great teacher. When Pomponazzi's treatise on "The Immortality of the Soul" was condemned by the Lateran Council, Bembo used his influence on its author's behalf, not out of any principle of toleration, but prompted by his admiration for the literary and philosophical qualities of the work. Bembo's own compositions include poems as obscene as any in literature, and we find the same Cardinal urging Sadoletto to "avoid the Epistles of St. Paul lest his barbarous style should spoil your taste."

Hardly less pagan were the two men bearing the name Alessandro Farnese, to whom other of Fracastor's works were dedicated. Of these Farnese, the elder assumed the new-fangled heathen title of Pontifex Maximus when he ascended the throne as Paul III to commence his corrupt papal career (Alessandro Farnese, 1468-

di Niccolò Copernico," Padua, 1880. German translation by Curtze in *Mitteilungen des Copernicus Vereins für Wissenschaft und Kunst zu Thorn*, Thorn, 1881, p. 49.

⁸ Recent studies of the philosophy of Pomponazzi are contained in A. H. Douglas, "The Philosophy and Psychology of Pietro Pomponazzi," Cambridge, 1910, and in a very interesting chapter in C. C. J.

1549, Pope 1534-1549). Nor was Alessandro Farnese the younger, Cardinal and patron of the arts, to whom Fracastor dedicated the "De contagionibus" and the poem "Joseph," less influenced by the prevailing humanism or more addicted to theological studies than his august relative, the prince of nepotists who sat in Peter's Chair.

Fracastor's temper of mind, like that of these men, was widely removed from theological and scholastic topics. He had, however, a nobler motive than the empty and mainly sensuous classicism that was the prevailing note of the intellectual Italians of his day. His greatest preoccupation was the extension of knowledge, and he is seen at his best as he applies the philosophical teaching of Pomponazzi in seeking to unravel natural laws from the complicated skein of natural phenomena. The ponderous conceits of his poems were the affectation of a period when the most skilled writers were but the "apes of Cicero." But intellectually he is a child of the new age and is begotten of the spirit of science in the matrix of humanism.

Fracastor spent the greater part of his life at his villa in the neighborhood of Verona, devoting himself largely to study. It is probable that motives of humanity, as well as interest in the subject, moved him, as it did Copernicus, to the practice of medicine among the neighboring peasantry. It is at least certain that his accurate clinical knowledge can only have been won by painstaking bedside experience. He took much interest in geographical discovery, which he followed on specially constructed globes. He was a devoted student of astronomical and mathematical problems. He was a very

Webb's "Studies in the History of Natural Theology," Oxford, 1915, p. 313. Pomponazzi's teaching which thus influenced Fracastor, is set forth in his "De naturalium effectuum admirandorum causis seu de incantationibus," Basle, 1567. This volume, however, was not published until long after the death of its author (in 1525) and of Fracastor (in 1553).

constant reader, and it is said that his favorite authors, Plutarch and Polybius, were seldom out of his hands. He delighted also in music. He lived in simple fashion, only occasionally emerging from his comparative seclusion to visit distinguished invalids, to give his opinion in difficult cases, or to study epidemics of unusual interest or gravity. His reputation alike as poet, humanist, physician and astronomer extended all over the civilized world. He was a man of extremely various and cultivated tastes, who took all the knowledge of his day to be his province. Such of his correspondence as has come down to us reveals a scholarly recluse, of genial and even jovial temper withal, whose high personal character, extensive intellectual interests and numerous literary friendships made him indifferent to worldly advancement.

In spite of the distinguished position that Fracastor held in the opinion of his contemporaries, the material for a detailed biography is by no means abundant. The earliest account is anonymous and is prefixed to the 1555 edition of his collected works.⁹ It is probably from the pen of Paolo Rhamnusio, a relative of his friend Giambattista Rhamnusio. A more comprehensive

but very unattractive compilation is Mencke's, dating from 1731.¹⁰ Among the more important modern accounts are those of W. P. Greswell (1801),¹¹ Giovanni Orto-Manara, Podestà of Verona (1842),¹² Ronchini (1868),¹³ Antonio Agostini (1883),¹⁴ William Osler (1906)¹⁵ and Roberto Massalongo (1915).¹⁶ Perhaps the most valuable recent work on Fracastoro is from the hand of Professor Giuseppe Rossi,¹⁷ who deals in detail with his philosophical position. Other modern authors who have handled special aspects of Fracastor's activity are Symonds (1882)¹⁸ and Barbarani (1891),¹⁹ who discuss his claims as a poet, Fiorini (1900),²⁰ who deals with his attitude towards geographical science, Crescimanno (1904),²¹ who discourses upon his relationship to the spirit of Italian unity, and Dreyer (1906)²² who deals with the interesting topic of the relation of his theory of the Cosmos to the Heliocentric doctrine of Copernicus. Fracastoro's work on the venereal plague of the Renaissance has itself given rise to an extensive literature and has been translated into practically every European language. Valuable material is contained in the editions of Colognese (1813),²³ Choulant (1830),²⁴ Yvaren (1847)²⁵ and Fournier (1870).²⁶ The poem has been translated into English on

⁹ "Hieronymi Fracastorii Veronensis, Opera Omnia," Venice (Giunta), 1555.

¹⁰ F. O. Mencke, "De vita et moribus scriptis meritisque. . . Hieronymi Fracastorii Veronensis," Leipzig, 1731.

¹¹ W. P. Greswell, "Memoirs of Angelus, Politianus, A. S. Sannazarius, Pietrus Bembo, Hieronymus Fracastorius. . .," Manchester, 1801, p. 161.

¹² Giovanni Orto Manara, "Intorno alla casa di Girolamo Fracastoro nella terra d'Incaffi," Venice, 1842.

¹³ Ronchini, "Girolamo Fracastoro," in *Atti della Deputazione della Storia patria modenense*. Modena, 1868.

¹⁴ Antonio Agostini in "Protomoteca veronese," Verona, 1883.

¹⁵ William Osler in *Proceedings of the Chbaraka Club*, N. Y., Vol. 2, December 1906, II, 5-20.

¹⁶ Roberto Massalongo, "Girolamo Fracastoro e la rinascenza della medicina in Italia," Venice, 1915.

¹⁷ Giuseppe Rossi, "Girolamo Fracastoro in relazione all' Aristotelismo ed alle scienze nel Rinascimento," Pisa, 1893.

¹⁸ J. A. Symonds, "The Renaissance in Italy," London, 1882, II, 476-481.

¹⁹ Emilio Barbarani, "Girolamo Fracastoro e le sue Opere," Venice, 1891.

²⁰ M. Fiorini, "Qualche cenno sopra Girolamo Fracastoro" in the *Rivista geografica italiana*, Rome, 1900.

²¹ G. Crescimanno, "Fra due poeti medici" (Giovanni Meli e Girolamo Fracastoro), Catania, 1906.

²² J. L. E. Dreyer, "History of Planetary Systems," Cambridge, 1906, pp. 296-301.

²³ Vincenzo Benini Colognese, "Della sifilide ovvero del morbo gallico di Girolamo Fracastoro," Milan, 1813.

several occasions. The earliest attempt is probably that of Nahum Tate (1686)²⁷ whose effort is in keeping with the other productions of one of the worst of the poets that have occupied the position of laureate. The other work of Fracastor that has been rendered into our tongue is the poem "Joseph." The version by Joshua Sylvester²⁸ (1563-1618) has, at least, a certain absurd quaintness to recommend it.

The student of Fracastor will find that the most convenient editions of his works are the Giunta *Opera Omnia* of 1555, 1574 or 1584. There is also a small but useful collection of letters printed at Venice in 1560²⁹ and re-edited at Padua in 1739.³⁰ These reveal something of the personal side of our author.

A number of prints, portraits and statues purporting to reproduce the features of Fracastor have survived. They differ so greatly from each other that it is hard to believe that they represent the same man. His iconography has been the subject of a recent study by Klebs.³¹

II. FRACASTOR'S CONTRIBUTIONS TO SCIENCE

By far the best known of Fracastor's compositions is his poem *Syphilis sive de morbo gallico*, written on the model of Manilius, or as some have thought, on that of the *Urania* of Giovanni Pontano (1426-1503).³² This pseudo-classical composition was dedicated to Cardinal Pietro Bembo, and was first published at Verona in 1530. On the artificial style and false imagery of this work his contemporaries lavished the most extravagant praise, but the modern

reader will find interest rather in the narrative itself than in the form in which it is cast. It is useful and interesting as a compendium of the views held at the time on the origin, nature, symptoms and treatment of the condition which it discusses. While it is a valuable storehouse of information it cannot be regarded as an original scientific contribution in the modern sense, and it displays little of Fracastor's most remarkable powers. It is rather in his purely scientific works, and especially in the "Homocentrica seu de stellis" (1538) and the "De contagionibus et contagiosis morbis" (1546) that we encounter at its best the clear cold light of Fracastor's intellect. In these works we not only find an acute and lucid analysis of the problems of which they treat, but we also discern a perception in its author of the meaning of the experimental method many years before the treatises of Francis Bacon and René Descartes. These scientific works of Fracastor are replete with suggestions that have proved of value, as the course of science has broadened, down to our own time.

In a writer of the first half of the sixteenth century we can hardly hope to find a large number of careful scientific conclusions worked out on a detailed basis of observation and experiment. It is only in his work on infection that Fracastor rises to a height that places him among first-class modern investigators. But in addition to this great contribution, he throws out a number of hints which have since yielded valuable results in other hands. In the extensive literature that has arisen around his name this purely scientific side of Fra-

²⁴ Ludwig Choulant, "Hieronymi Fracastorii Syphilis sive morbus gallicus," Leipzig, 1830.

²⁵ Prosper Yvaren, "La syphilis. Poème en vers latins de Jérôme Fracastor traduit en vers français précédé d'une étude historique et scientifique sur Fracastor," Paris, 1847.

²⁶ Alfred Fournier, "Fracastor La syphilis (1530), Le mal français," Paris, 1870.

²⁷ Nahum Tate, "Syphilis," London, 1686.

²⁸ Joshua Sylvester, "The Maiden's Blush," London, 1620.

²⁹ "Lettere di XIII huomini illustri," Venice, 1560.

³⁰ "Hieronymi Fracastorii Carmina," Padua, 1739.

³¹ A. C. Klebs, Iconographic notes, Johns Hopkins Hospital Bulletin, Baltimore, 1915, xxvi, 378-380, 1 pl.

³² J. A. Symonds, Renaissance in Italy, II, 364.

castor's works has been largely neglected in favor of certain other interests which they present. We therefore endeavor to summarise such suggestions and conclusions in his writings as have since become absorbed into the mass of natural knowledge.

(1) The thesis of the work "*Homocentrica*" (1538) is to oppose the *eccentric* or *epicyclic* view of the movements of the planets as laid down by Hipparchus of Nicæa (circa 150 B.C.) and handed on to the Middle Ages by Claudius Ptolemæus.³³ It is thus a preparation for the epoch-making Heliocentric work of Copernicus,³⁴ which did not see the light until the great astronomer lay on his death-bed in 1543, though preliminary drafts had been made at a somewhat earlier date.³⁵ Both the "*Homocentrica*" of Fracastoro and the "*De revolutionibus orbium cœlestium*" of Copernicus were dedicated to the same patron, Pope Paul III. Although it would be absurd to compare the importance of the two works, they are yet both conceived in the same broad spirit of naturalism, the seed of which was perhaps sown in the student days of the two men by Pomponazzi at Padua. It is likely that Fracastor was one of the very earliest to embrace the heliocentric theory of his fellow-student.

(2) Fracastor was greatly puzzled at

³³ The astronomical system of Copernicus is described by J. L. E. Dreyer, loc. cit.

³⁴ Nicolaus Koppnigk "*De revolutionibus orbium cœlestium. Libri VI*," Nuremberg, 1543. The first to point out that Fracastoro was in certain senses a predecessor of Copernicus was J. S. Bailly in his "*Histoire de l'astronomie moderne en Europe*," pp. 19, 20, Paris, 1805. He is opposed by Siegmund Günther, "*Studien zur Geschichte der math. und physikalisch. Geographie*," Halle, 1877, Heft I, 37, but supported by Favaro, loc. cit.

³⁵ A "*Commentariolus*" or short summary of the work appears to have been written out by Copernicus about 1530 while his pupil Rheticus printed a short account of it as "*Narratio prima*" at Danzig in 1540. Both these works are reprinted by K. Prowe in his "*Nicolaus Copernicus*," 2 vols., Berlin, 1883-4.

being unable to fit in his own observations of the relation of the ecliptic to the fixed stars with the records of Ptolemy and other astronomers. He explains the divergence as due to a movement of the ecliptic itself.³⁶

(3) After the theory of Copernicus had been firmly established through the labors of Galileo and of Kepler, it became customary to fashion models illustrating the movements of the planets. These engines became a vogue in the eighteenth century and received in England the name *Orrery*.³⁷ It is probable that the first Orrery was constructed for Fracastor himself.³⁸ We read of him demonstrating on such "an instrument made according to the newly discovered motion of the heavens" in the *Discorso sopra varii viaggi per li quali sono state condotte et si potrian condurre le spetierie*, which was published by his friend Rhamnusio in 1550.³⁹

(4) Fracastor takes a definite place in the history of geographical science. He is the first writer to apply the term *pole* to the globe of the earth itself.⁴⁰ Again, the first great Italian collection of voyages was dedicated to him and to that work he himself contributed an article on the source of the Nile. The origin of the White Nile he places not very inaccurately in a great lake about midway between the tropic of Capri-

³⁶ *Homocentrica*, I, 15.

³⁷ After the Earl of Orrery, brother of Robert Boyle.

³⁸ Moving models of the universe, based, however, on the geocentric system had been known in ancient Greek times.

³⁹ The "*Discorso*" of Giambattista Rhamnusio is to be found on p. 398 recto of the 1550 edition of the "*Viaggi et Navigazioni*." On p. 401 recto of this work occurs the phrase quoted, "uno instrumento fatto sopra un moto de' cieli trovato di nuovo." The passage was probably written in 1547, possibly earlier, but the instrument must have taken some time to manufacture. We are thus brought very near to 1543, the date of Copernicus' book. On the question of the date and nature of this "*Orrery*" see M. Fiorini in "*Rivista geografica italiana*," 1900, pp. 438-445.

corn and the Equator, while he knows that the Blue Nile gathers its waters in the highlands of Ethiopia.⁴¹

One of the great difficulties of the early map-makers was the absence of a satisfactory system of projection. Globes were not only difficult to construct but were of their nature only applicable for very large geographical areas. The "portolano" charts represented distances actually measured by travel and were hardly maps in our sense of the word. The Ptolemy MSS. usually contain maps of the cylindrical type of projection. In one or two works, both printed and manuscript, an equally clumsy method, the "pseudoconic equidistant," had been introduced.

It was not until 1569, sixteen years after Fracastor's death; that the Fleming Gerhard Kremer (Gerardus Mercator, 1512-1594) produced his first rectilinear map on the system now known as Mercator's projection.⁴² In a letter to Rhamnusio dated May 10, 1549, first published in 1560, Fracastoro had suggested the use of this very system and expressed surprise that it had not been adopted by cartographers.

(5) Fracastor was the first to hold that Western European land and water was subject to secular changes of elevation, so that an area now dry and even raised to mountainous height may once have been submerged. "If a man consider," he writes, "how islands and mountains come into being, he will recognize that time was when they were built out from the sea and that

time will be when land now covered by the waves will be habited and tilled, and yet again in future time will be again hidden by Ocean."⁴³ The doctrine of the secular changes of land and sea had already been set forth in the thirteenth century by the Arabian writer Kazrini, whose views must have been widespread since numerous MSS. of his "Wonders of Nature" have survived in both Arabic and Persian. Fracastor either originated the idea anew or, at least, introduced it to the West.⁴⁴ This theory of geological elevation was seized by several of Fracastoro's contemporaries,⁴⁵ by Hieronymo Cardano (1501-1575), by Bernard Palissy the potter (1510-1590), by Andrea Cesalpino (1519-1603), by Conrad Gesner (1516-1565). These all used the theory to explain the presence of fossil marine forms at heights above the sea, and the idea was further elaborated by the Dane, Niels Stensen (Nicolaus Steno, 1638-1686) in the following century, in a work which laid the foundations of modern geology.⁴⁶

(6) Fracastor was one of the few writers of his day who had any idea of the nature of refraction of light. In his application of this conception, though he is sometimes confused, he is yet in some ways superior to any of his predecessors, Alhazen (died 1038), Roger Bacon (1214?-1294), Vitellio (circa 1300), or John of Peckham (died 1292). Fracastor's views were hardly improved upon until the researches of Francesco Maurolico (about 1575) and Willibrod Snell van Royen (about 1620).

E. Nordenskiöld, "Facsimile-Atlas," Stockholm, 1889, p. 49.

⁴³ Homocentrica, I, 12.

⁴⁴ Kazrini's geological doctrine is discussed by R. Knox, *Anthropological Review*, 1863, I, p. 263.

⁴⁵ It is encountered in an Irish tract that perhaps borrowed from Fracastor. See Maura Power, "An Irish Astronomical Tract based . . . on Messehalah," London, 1914, p. 37.

⁴⁶ Nicolaus Steno, "De solido intra solidum naturaliter contento dissertationes, prodromus," Florence, 1669.

⁴⁰ E.g. De sympathia et antipathia rerum, Cap. 7.

⁴¹ "Risposta dello eccellentissimo messer Hieronimo Fracastorio del crescimento del Nilo a messer Giovanni Battista Rhamnusio" in "Navigationi et Viaggi," Venice, 1550, p. 284 verso.

⁴² Gerhard Kremer (Gerardus Mercator), "Nova et aucta orbis terræ descriptio ad usum navigantium emendate accomodata." "Aeditum est opus hoc Duisburgi an. D. 1569 mense Augusto." A map that appears to be constructed on the same principle as Mercator's, the work of Claudius Clavius, and dated 1427 is to be found in the library at Nancy. See. A

(7) Fracastor was probably the first to suggest the combination of lenses as an aid to vision; and he thus gives the first hint in literature of the construction of a telescope. We here render the most important passages in his writings on the subject of the refraction of light and the use of lenses.

In reading this account, the technical meaning attached to the word *species* in Mediæval and Renaissance optics must be borne in mind. It was held that visible objects were constantly emitting images of themselves or *species* as they were called. These emissions, if they collided with certain other emissions of the so-called *visual spirit*, which was held to proceed from the retina, resulted in the production of *visual sensation*. The collision was supposed to take place in the forefront of the eye. The variation in the size of the pupil was regarded as a device for regulating the amount and intensity of the collision.

It must further be remembered that the universe was regarded as composed of a series of concentric spheres placed one inside the other like the skins of an onion. In the center was the earth, around it the atmosphere, and around that seven spheres or heavens corresponding one to each of the seven planets. Beyond the outermost of these seven spheres (in which moved the planet Saturn), was the heaven containing the fixed stars. In order to reach the earth, the *species* from a fixed star had therefore to penetrate the seven spheres of the seven planets and finally the atmosphere.

"We maintain that the planets do not really vary in altitude [as some have claimed] but that they seem to do so for certain reasons, of which one depends upon the *medium*. By medium is meant that transparent body through which the *species* of visible things reach the vision.

If the medium is subtle, all things in it

seem smaller and more remote; if thick and dense they appear larger and nearer as may be seen in water, glass and crystal. Thus was discovered the application of those lenses (*specillorum*) that are called *ocularia* [= spectacles]. Thus also, objects such as oars, that are part in air and part in water, look as though broken,⁴⁷ for the part in water appears nearer than it would if viewed directly through the air.

"Now this factor, which depends upon the medium, does not seem to have been sufficiently considered by those authors who maintain the *eccentric* [i.e. epicyclic] theory, for they have considered no media other than air and water. Thus Ptolemy, for instance, having perceived that the cause of certain phenomena could not be explained as due to the atmosphere, rejected the medium altogether as a cause of these appearances. We, however, consider that air and water and their kinds are not the only sorts of media through which *species* reach us from the stars, but that the heavens themselves and their strata (*partes*) provide such media.

"That the heavens are transparent is manifest, but that they are denser in some parts and rarer in others is demonstrated by the stars and by the disc (*corpus*) of the moon. For there are in the spheres (*oribus*) certain most rare and subtle strata (*partes*) through which such *species* as of the stars pass unaltered (*nihil repacta*) and there are others, utterly dense, through which the *species* may in no wise pass, but are wholly reflected back. And there are yet other media from which the *species* are in part reflected, but through which they do in part penetrate.

"Some call this [latter process] *refraction*, distinguishing *refraction* from *reflexion*. In *reflexion* the incident *species* do not pene-

⁴⁷ Cf. Seneca, *Quæstiones naturales* I, 3 and I, 6. It is doubtful whether Seneca's ideas of refraction could have been derived from Aristotle. The conception of

the refraction of light was to some extent developed in the Middle Ages by Alhazen, Roger Bacon, Vitellio and John of Peckham.

trate but are wholly thrown back again. In refraction, however, although there may be a degree of reflexion yet the species do penetrate and affect vision directly. Now such parts of the spheres (*orbium*) as refract the species render all objects larger and nearer. So with the stars which are subject to such factors both in the air and also in the heavenly spheres, some of which are denser, some subtler.

"As regards the atmosphere we may observe that in calm winter weather and especially towards the south the stars look larger, while in summer and towards the north they appear smaller. The influence of the heavenly spheres is similar, as we shall show later.

"Now a *deep* medium makes objects appear larger and nearer; and the deeper it is the greater its effects, so that the further the species come through a dense medium, the greater [relatively] appear the objects. Thus in the same mass of water, objects at the bottom are relatively more enlarged than those at the top.⁴⁸ So if one looks through two lenses (*specilla ocularia*) placed one in front of the other, all objects look much larger and nearer. In the same way there are certain stars which, when near the horizon appear larger and nearer, but when towards the zenith (*in medio celi*) seem smaller and more remote. For species near the horizon come through a greater depth of medium, and they come through more of the atmosphere which is loaded with the multitude of vapors that are ever about the earth than do species from the region of the zenith (*e medio celi*). . . .

"Let EFGH be the earth and ABCD the sphere of vapors around it. Let BE be the horizon. Then a star near the horizon will be seen along the line BE, one at the zenith along AE. But BE is

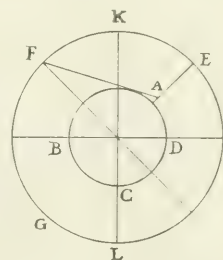
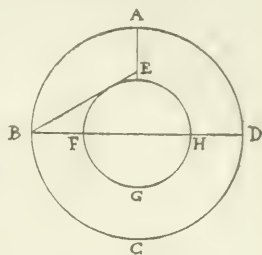
greater than AE and therefore the species in that region have to pass through more vapors.

"For the samereason, all stars as they rise northward appear less to us [i.e., in Italy] and as they pass east greater; then as they sink southward they are yet greater and returning on the east less again. For with us [in Italy] a star is near the horizon when it turns southward and it passes eastward near the zenith.

"Let ABCD be the earth and FA our horizon, EFGH the sphere of vapors, KL the equator and E a northern and F a southern star. But the southern star is near our horizon and is seen along the line FA, the northern star is, however, nearer the zenith and seen along the line EA, which is less than FA.

"For a similar reason some of the planets seem larger when they are in quadrature to the sun, so that his species is refracted through a greater part of their sphere, a matter of which we shall treat presently.

"But (not only the character but) also the *position* of the medium affects the appearance of the object seen, as may be observed with lenses (*in specillis ocularibus*). For if a lens be placed midway between eye and object, it appears much larger than if the lens is made to approach the object or the eye.⁴⁹

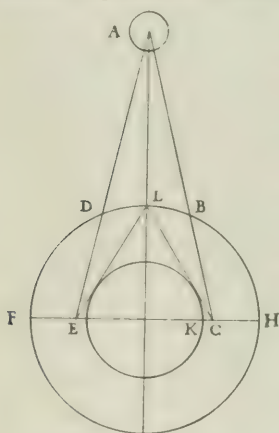


⁴⁸ This property of water was, of course, well known to the ancients and is mentioned among

others in the *Problemata* of Aristotle and by Archimedes, Seneca and Heron of Alexandria.

"Now concerning the differing appearance of the moon, according as it is in quadrature or rapid motion [i.e. perigee]. In both, it appears larger and nearer and its appearance varies greatly. . . . The moon appears larger and nearer when in quadrature because the species of the sun falling upon the moon is refracted through a greater part of the sphere than when the moon is in any position other than quadrature.

"Let GFDH be the moon's sphere and let KH represent its depth, the sun being



at A, above the moon in quadrature at C or E. Species or rays from the sun come to the moon along the lines BC or those which are refracted at L through LC. Similarly in the other quadrature they come

through DE or LE, nor can there be any longer lines than these [i.e. refracted through a greater depth of medium] when the moon is in other positions.⁴⁹ Wherefore the species of the sun is more refracted in quadrature than in any other position; wherefore the moon appears larger and nearer for the same reason that do objects in a depth of water.

"In the same way glasses (*specilla ocularia*) may be made of such density that if any one looks through them at the moon or at any star they appear near and hardly bigger than the steeples (*turres*) and it

ought not therefore to appear incredible that sections of the spheres may have the same effect. An instance of this is the fact that the other planets may appear greater in quadrature as I have often observed with Jupiter."⁵¹

The remaining more important scientific conceptions with which Fracastor was concerned are contained in his work "*De Contagionibus*" which we shall presently discuss in detail. They may be thus briefly enumerated.

(8) He enunciated clearly, perhaps for the first time, the modern doctrine of the specific characters of fevers.

(9) He was among the first to distinguish clearly as a clinical entity the disease now known as *typhus fever*.

(10) He laid the true basis of the whole of modern teaching on the subject of infection by means of his doctrine of "*seminaria*."

III. FRACASTOR'S THEORY OF INFECTION

At the back of all modern views on the nature of infectious disease lies the work of Fracastor. In the words of a younger contemporary "it was he who first opened men's eyes to the nature of contagion."⁵² To Fracastor belongs the credit of finally and clearly distinguishing the three categories of infection, by contact, by fomites and at a distance. His doctrine of infection arising from and conveyed by hidden germs or seeds has formed the basis of most of the best work on the subject in the centuries that have followed.

For generations but little advance was made on his teaching, but at length it became incorporated in the work of a school mainly composed of Italian writers who, led by Francesco Redi (1626-1694), Giovanni Maria Lancisi (1654-1720), and Antonio

⁴⁹ Homocentrica, II, 8.

⁵⁰ This passage is based on a misunderstanding of the nature of refraction which he supposes to take place only when the rays fall vertically on the surface of the medium.

⁵¹ Homocentrica, III, 23.

⁵² Hieronymo Mercuriali. *Praelectiones Patavii habitae 1577 in quibus de peste tractatur. De peste in universam, praesertim vero de Veneta et Patavina. Venice, 1577. Cap. XIII.*

Vallisnieri (1661-1730), took, in the seventeenth and eighteenth centuries another step towards a scientific demonstration of the nature of infection. The third great step belongs to the history of modern medicine and is associated with that group of ideas that cluster around the names of Pasteur, Lister, and Koch. But to Fracastor as to the father of modern rational pathology we must always return, and the influence of his ideas is discernible even in recent developments of that science.

For the study of epidemics Fracastor lived in a peculiarly favorable locality and period. When he was yet a lad of about sixteen, the venereal plague was first recognized in Italy. It was at this period, according to him, that the disease was given the name of *morbus gallicus*, a title confirmed perhaps by the extensive infection that grew up in Paris two years later, when matters had reached such a pass that a decree was issued requiring all infected persons to leave the town within twenty-four hours.⁵³ In his manhood Fracastor was the witness of successive waves of plague and of epidemic typhus which swept over the peninsula. He had ample opportunity to study phthisis and rabies, and in speaking of these he shows much knowledge and clinical acumen. Of diseases which came less directly within his observation such as the

English Sweat and *Leprosy* he writes with discretion and judgment.

The doctrine of disease *germs* or *seeds* which forms Fracastor's best claim to scientific eminence had dawned upon him before 1530. It is foreshadowed in a Lucretian passage in the "Syphilis" that was printed in that year. At that date, however, he still regarded alteration in the air itself, "miasma," as the main cause of epidemic disease.⁵⁴ His reputation as a scientific medical writer is more safely based upon his "De contagionibus et contagiosis morbis et eorum curatione."⁵⁵ which appeared at Venice in 1546.

The excellences of this work are so numerous as to mark an epoch in the history of medicine. It is written in a clear and straightforward style and is not of inordinate length. Essentially a practical work, yet written in a thoughtful and philosophical mood by a physician of experience, it betrays an industrious accumulation of clinical data and relies little on mere hearsay. There is almost complete freedom from the wearisome list of quotations from the writings of others through which the reader has to wade in most contemporary treatises. In this as in all his works, the author shows himself singularly devoid of superstition, although he naturally shares some of the errors of his time.

⁵³ It has been shown, however, that the term "mal franzoso" was in use as early as the fourteenth century. See Karl Sudhoff, "Zur historischen Biologie der Krankheitserreger," Heft 5. "Mal Franzoso in Italien in der ersten Hälfte des 15. Jahrhunderts. Ein Blatt aus der Geschichte der Syphilis." Giessen, 1912. See also the same author in *Dermatologische Zeitschrift*, Band XX, Heft 14, 1913, also "Der Ursprung der Syphilis. Vortrag gehalten auf dem internationalen medizinischen Kongress zu London am August 7, 1913," Leipzig, 1913, and "Ein neues Syphilisblatt aus dem Ende des 15. Jahrhunderts" in *Arch. für Gesch. der Med.*, Vol. I, p. 374, Leipzig, 1908. Also Paul Richter, "Ueber Conrad Schellig und sein 'consilium in pustulas malas,'" in *Arch. für Gesch. der Med.*, Vol. III, p. 135, Leipzig, 1910.

⁵⁴ Quumque animadvertas tam vastæ semina labis
Esse nec in terræ gremio, nec in æquore posse,
Haud dubie tecum statuas reputesque, necesse est,
Principium, sedemque mali consistere in ipso
Aere, qui terras circum diffunditur omnes,
Qui nobis sese insinuat per corpora ubique,
Suetus et has generi viventium immittere pestes.
Aer quippe pater rerum est, et originis auctor.
Idem sæpe graves morbos mortalibus affert,
Multimode natus tabescere corpore molli,
Et facile affectus capere, atque inferre receptos.
Nunc vero, quonam ille modo contagia traxit,
Accipe: quid murate queant labentia sæcla.

Syphilis, Lib. I.

⁵⁵ The "De sympathia et antipathia rerum" appeared at the same time and in the same volume. With this work, however, we are not here concerned.

The relationship between epidemics as a result and infection as a cause is clearly grasped and philosophically expounded by Fracastor and is not confused by speculation on the barren topic of miasma, which proved a snare to many contemporary writers. The orders of infection are logically distinguished. Lastly, the theme of the conveyance of infection by minute particles having some of the properties of seeds is skillfully developed and interwoven with the humoral pathology. Fracastor had not the modern conception of universal biogenesis. It is probable, from his philosophic standpoint, that he would have refused to accept the usual modern scientific distinction between the organic and the inorganic. It is therefore idle to discuss whether he regarded these germs, seeds or semina as living or non-living since the distinction would not have appeared important to him. In any event, he believed that infectious diseases could be originated anew. But for this heresy, there is little enough in the main outline of his views that would need reconstruction by an orthodox pathologist of to-day.

To appreciate justly the place of the "De Contagionibus" in the history of medical thought, it is necessary to consider the general current of the teaching on the subject of infection up to the date of its publication. In the following chapter we seek to pass this in rapid review.

IV. KNOWLEDGE OF THE PHENOMENA OF INFECTION AMONG THE ANCIENTS

(a) *Among Primitive Folk.*

To the primitive mind the properties of all matter appear capable of transference to contiguous or neighboring substance, even of dissimilar nature. In a kind of savage logic described by modern folk-lorists under the term "Magic," primitive man exhibits a crude species of reasoning, based sometimes on propinquity, sometimes on simi-

larity. Those governed by such ideas regard all material things as presenting contagious properties, the infection either passing from one body to another in actual physical juxtaposition or at a distance through the agency of "sympathetic" or "symbolic" magic. Purity and defilement have hardly yet risen to their ritual significance. These conditions are as yet a part of daily life and follow on natural contact with clean and unclean objects. Thus to the savage, the phenomena of infectious and contagious disease are but part of the general order of his world.

In a higher state of culture, Religion has become differentiated from its parent, or cousin, Magic. The untoward and unexpected events of life—and among these epidemics take a prominent place—are now attributed to the intervention of supernatural powers. From the earliest historic ages, epidemics have indeed puzzled the mind and terrified the heart of man. It is the unknown that is most dreaded, and the pestilence that walketh in darkness has been ever more terrible than the arrow that flieth by day. The Biblical writer strikes a true human note when he makes the appearance of the very Angel of Death at the threshing floor of Araunah come as a relief to the stricken King of Israel.

Probably all races that have reached the level of social complexity implied by formal legislation have exhibited some knowledge of the phenomena of infectious disease. Babylonians, Hebrews, Egyptians, Indians and Chinese, all had codes adapted to the prevention of infection. The Buddhist to this day avoids some water-borne diseases by drinking only filtered water, lest he should sin by consuming the minute creatures that abound in brooks, rivers and springs: the Hebrew has for ages escaped a certain amount at least of tuberculous disease by following the law which bids him reject the carcasses of cattle with diseased lungs; and even races very low in the scale of

civilization will measure around the camp a space within which the taboo forbids the deposit of excreta. While the religious bases of such actions may be very foreign to the modern mood, the actions themselves are not infrequently in close accord with modern hygienic doctrine.

(b) *Knowledge of Infection of the Ancient Greek and Roman Writers.*

To the physicians of Greece and Rome epidemics of all kinds were known as common accompaniments of warfare and of natural catastrophes, although infection proper as we understand it, was seldom distinguished by them from that general infection which we call an epidemic. Among the Greeks the direct influence of the gods was passing into the background and it was recognized that outbreaks of certain types of disease followed rather on certain natural events, such as excessive rainfall, for epidemics had been observed to prevail with special winds and at the changes of the seasons. Overcrowding again, and the inhalation of air breathed by others were regarded as modes of breeding disease: while unburied corpses, exhalations set free by earthquakes and even defective drains, were all considered dangerous to health. These observations combined with crude notions on spontaneous generation were not without influence in leading speculation towards a theory of zymotic disease.

But to most of the Greek and Latin medical authors whose works have come down to us, the mechanism of widespread

infection was frankly incomprehensible. The ancients of the classical period of Greece and Rome were as anxious as any modern scientist to seek the immediate real causes of disease. But in those days as in these, ætiological literature largely consisted of what were even then felt to be either simply verbal explanations or mere lists of associated conditions, to be used in the absence of better means, for the satisfaction of the ignorant. Æsculapius, by the bedside a god, became like his modern representative, a sorely puzzled soul when he had gained the reflective solitude of his study.

The Father of Medicine (*circ.* 400 B.C.) appears to have had no conception that epidemic diseases were infectious,⁵⁶ in the sense in which we now use the word. By him they were regarded as due primarily to atmospheric conditions. He is reported to have extinguished the plague of Athens by lighting fires as an atmospheric corrective, a procedure widely adopted in such emergencies until recent times. It will indeed be seen, as we proceed, that all the causes regarded by the early medical writers as leading to epidemics were to some extent connected with a "change in the atmosphere."

Hippocrates observed the immense influence of climate on health⁵⁷—and urged the study both of permanent and temporary climatic factors. In the doubtfully Hippocratic treatise "On the Nature of Man"⁵⁸ we find a discussion of the phenomena of epidemics,⁵⁹ where the air is given as the only possible "universally acting cause" of

⁵⁶ The Hippocratic writings seem to present a contrast in this respect to the somewhat earlier Levitical code. It must, however, be noted that although the regulations of that code, as regards leprosy, presumably imply a belief in infection, such a belief is nowhere stated, and the facts are capable of other interpretation. Cp. M. Jastrow. "The so-called Leprosy Laws." *Jewish Quarterly Review*, New Series, IV, 358. Philadelphia 1914.

⁵⁷ Hippocrates. *Airs Waters and Places* Caps 1, 10, 15, etc. Epidemics Bk. 1. § 1 and 2, Bk. 3. § 3. Aphorisms 3.

⁵⁸ Pseudo-Hippocrates. "On the Nature of Man," Cap. 9. According to Greenhill and Adams this work comprises fragments by different authors, probably about contemporary with Hippocrates.

By unknown author about contemporary with Hippocrates.	⁵⁹ Cf. also: { Humors 14. Epidemics	Bk. 2, §1, 3; Bk. 4, §7, §46. Bk. 6, §5, §7.
By various authors rather later than Hippocrates.	{ Humors 8. Epidemics	Bk. 7, § 105. Bk. 5, § 94.

widespread disease, an idea which deeply affected mediæval beliefs.

The teaching of the Hippocratic school on the subject of atmospheric conditions was elaborated in the succeeding centuries. Thus the author of the treatise known as the *Problems of Aristotle* recognized certain phenomena of infection, discussed the various "epidemic constitutions" and dwelt especially on the result of a hot sun drawing up mists from the earth.⁶⁰ Similar views are to be found in Lucretius,⁶¹ Diodorus Siculus,⁶² Silius Italicus,⁶³ Lucan,⁶⁴ Manilius,⁶⁵ and Marcus Aurelius.⁶⁶ Galen develops the same theme, noting the effects of climate both directly on the patient and more indirectly through the degradation of the air breathed by him.⁶⁷ Among the potent causes of this degradation, he mentions marshes and stagnant water. Oribasius⁶⁸ also gives marshes and fogs among the causes of fevers, and is followed by Aetius,⁶⁹ Paul of Aegina,⁷⁰ Ammianus Marcellinus,⁷¹ Alexan-

der of Aphrodisias,⁷² and Eustathius Diaconus.⁷³

The first writer to whom can be traced a definite and formal belief in the passage of specific infectious disease from person to person is Thucydides (B.C. 471-391). In his description of the plague of Athens the historian definitely commits himself to the view that those who came most intimately in contact with the sick were the most liable to contract the disease.⁷⁴ Very similar views are found in a long list of writers among whom may be mentioned the author of the "Problems of Aristotle"⁷⁵ (B.C. 384-322), Lucretius (B.C. 95-55),⁷⁶ Virgil⁷⁷ (B.C. 70-A.D. 19), Dion Cassius of Utica⁷⁸ (circa B.C. 40), Dionysius of Halicarnassus⁷⁹ (died B.C. 7), Livy⁸⁰ (B.C. 59-A.D. 17), Diodorus Siculus⁸¹ (circa B.C. 20), Ovid⁸² (B.C. 43-A.D. 18), Seneca⁸³ (circa A.D. 60), Pliny the Elder⁸⁴ (A.D. 23-79), Silius Italicus⁸⁵ (A.D. 25-100), Plutarch⁸⁶ (circa A.D. 80), Appian⁸⁷ (circa A.D. 120), Eusebius⁸⁸ (A.D.

⁶⁰ Problems. §1. cap. 21.

⁶¹ Titus Lucretius Carus. *De Rerum Natura*. lib. VI, line 1100 et seq. of H. A. J. Munro's version.

⁶² Diodorus Siculus. *Bibliotheca Historica*. Bk. 14. §291.

⁶³ Silius Italicus, *Punica*, Bk. XIV.

⁶⁴ Marcus Annæus Lucanus, *Civiles bellum vel Pharsalia* VI.

⁶⁵ Marcus Manilius. *Astronomicon*.

⁶⁶ Marcus Aurelius Antoninus. *Meditations*. Bk. IX, cap. 2.

⁶⁷ Galen. *Commentary 1 on Epidemics of Hippocrates*, lib. 1; *Ad Glaucum de methodo medendi* preface and lib. 1; *De diff. feb. lib. 1*, cap. 6; *de methodo medendi bk. 1*, cap. 11; *com. 3. on Hipp. de humoribus*, and *Com. 2 on Hippocrates "De natura hominis."* Cap. 4.

⁶⁸ Oribasius, *Synopsis* VI. 24.

⁶⁹ Aetius. *Contractæ medicinæ tetrabibli*. Bk. 1. sermo 3. Cap. CLXII, CLXIII: Bk. 2. sermo 1, sermo 5, cap. XCIV.

⁷⁰ Paulus Aegineta, Bk. 2, § 35.

⁷¹ Ammianus Marcellinus, *Res gestæ*, Bk. XIX, cap. 4.

⁷² Alexander Aphrodisæus, *Aphorisms* 65, 159.

⁷³ Eustathius Diaconus, *Commentary on Homer's Iliad*. § LXI.

⁷⁴ Thucydides, *History of the Peloponnesian War*, Book II, cap. 47 et seq.

⁷⁵ Problems, § VII. Cap. 8.

⁷⁶ Lucretius, *De rerum natura* VI, especially from line 1230 onward.

⁷⁷ Virgil, *Eclogues* I, 50; *Georgics*, III. 469.

⁷⁸ Dion Cassius, *Roman History*. *Reign of Augustus*, Book 53. (Protulus covers his nose and mouth with his hand to let the company know that it was unsafe to breathe the same air as Largus, who had accused his friend Gallus.)

⁷⁹ Dionysius of Halicarnassus. *Romanorum antiquitatum*. Lib. X. cap. 53.

⁸⁰ Livy Patavinus, *Res gestæ populi Romani*, Bk. 25.

⁸¹ Diodorus Siculus, *Bibliotheca historica*, Bk. 14. §291.

⁸² Ovid. *Metamorphoseon*, Lib. VII. 551.

⁸³ Seneca, *De tranquillate animi*, § 7.

⁸⁴ Pliny the Elder, *Naturalis Historia*, XXIII. 80.

⁸⁵ Silius Italicus, *Punic Wars*, Bk. 14.

⁸⁶ Plutarch, *Symposiaca problemata*, Decas IV, Problem 7.

⁸⁷ Appian of Alexandria. *Historia Romana*. Lib. X, cap. 1.

⁸⁸ Eusebius Pamphili, Bishop of Cæsarea in Palestine. *Historia ecclesiastica*, Lib. VII. cap. 21, quoting "Paschal Epistle of Dionysius."

264-340), Gregoras Nicephoras⁸⁹ (died A. D. 394), St. John Chrysostom⁹⁰ (347-407 A.D.), Evagrius of Epiphania⁹¹ (A.D. 536-594), and Vegetius⁹² and many others.⁹³ The popular writings of Isidore of Seville (died A.D. 636) may be regarded as the medium through which the doctrine of contagion passed from classical antiquity into mediæval and barbarian Europe.⁹⁴

Aretæus the Cappadocian⁹⁵ who lived in the second century of the present era is the earliest writer known to us who extended the theory of infection, so as to distinguish definitely between the conveyance of a disease by contact or at a distance. "A man," he says, "may be seized with rabies from respiring the effluvia of the tongue of a dog, without having been bitten." Although the observation on which he bases his view is inaccurate, he was thus on the road to a more correct conception of contagion. Coelius Aurelianus makes a similar distinction for hydrophobia,⁹⁶ elephantiasis⁹⁷ and perhaps for plague. Galen had a clear view of the distinction between infection and contagion and regarded as infectious consumption⁹⁸ as well as those other diseases which gave rise to fetid respiration. Aetius (sixth century)⁹⁹ believed in the contagion of "elephantiasis" and Paul of Aegina¹⁰⁰ recommended the segregation of patients from this disease since it is "no less easily communicable than the plague."

Thus the doctrine of infection was well known to the classical writers of Greece and Rome. Nevertheless it is important to

remember that infection formed with them only a minor factor in the production of disease. Its existence was admitted, but far more stress was laid on the physical conditions in which epidemics arose than on the passage of the condition from person to person. Thus in the description that Lucretius gives of the plague (*De Rerum Natura* VI) although some 200 lines are devoted to the subject and the atmospheric influences are fully discussed, the passage of the disease from person to person is dismissed in a few words. With the ancients, in fact, it was always "miasma" rather than contagion that was feared.

Before leaving these medical writers of Greece and Rome we may consider certain of their pathological theories, which were involved in their conception of the nature of infection and contagion. These conceptions dominated medical thought until the seventeenth century and their influence lay heavy on Fracastor and may be traced even in modern times.

The Hippocratic school recognized the four humors, blood, phlegm, black bile and yellow bile and the corresponding qualities, heat, cold, dryness and moisture. Hippocrates himself attributed diseases, including epidemics, to a disturbance in the distribution and quality of the humors, due most often to atmospheric changes. An observant physician could not fail to note the element of putridity in many infectious conditions, especially in the group associated with various forms of septic throat or "cyn-

tion XXXVI. "On the Plague, from the works of Rufus," Vol. I, p. 277 *et seq.*

⁸⁹ Thus Isidore of Seville *De natura rerum. De Pestilentia* XXXIX, 2, is taken from Lucretius VI, 1100.

⁹⁰ Aretæus Cappadox, *The Causes and Symptoms of Acute Diseases*, Book I, Ch. 7.

⁹¹ Coelius Aurelianus. *Celerum passionum*. Book III, Ch. 9 and 13.

⁹² Ibid. *Tardarum passionum*, Book I, Ch. 1.

⁹³ Galen, *De diff. febr.* 1. 4.

⁹⁴ Aetius, *Sermo XIII*, Cap. 120.

¹⁰⁰ Paulus Aegineta, Book 4, §1.

⁸⁹ Gregoras Nicephoras. *History of Byzantium*. Bk. 16, Chap. 1, § 798.

⁹⁰ St. John Chrysostom. In Joan. Orat. 57.

⁹¹ Evagrius Scholasticus. *Historia ecclesiastica*, Cap. 29 (contagion among various other puzzling phenomena).

⁹² Renatus Vegetius. *Ars veterinaria sive mulo medicina*, Lib. III, Caps. 2, 23.

⁹³ For a masterly review of the doctrine of contagion in the classical period of Greece and Rome the reader may be referred to Francis Adams' "The Seven Books of Paulus Aegineta." 3 vols., London, 1844. See especially commentary on Book II, Sec-

anche," as it was called, and with various forms of skin eruption in which a pustular element was liable to supervene. The term "putridity" or "fermentation" of the humors became a sort of epidemiological master-key, the use of which continued right down to the nineteenth century. Thus the learned and eloquent Sir Thomas Watson wrote in 1848:

"The ancients attributed various disorders to a fermentation of the animal fluids. The cause of fever, according to Hippocrates was some morbid matter in the blood. This matter, by a process of concoction, was brought, in a certain number of days, into a state in which it was ready for expulsion from the body. . . . The doctrine thus enunciated by the father of physic is very nearly the same with that which Liebig is teaching in the nineteenth century."¹

This doctrine of fever and contagion as related to a putridity or fermentation of the humors had thus lasted for over twenty-two centuries before it was appreciably modified by the workers who have given us our modern theories on the subject.

It was early recognized, however, that not all infectious diseases were associated with demonstrable putrescence. The explanation was that the change, confined to the humors, need not necessarily exhibit itself externally, although it could convey its own nature to the circumambient air and thus infect others. Fevers were therefore divided into putrid and non-putrid, a simple classification that was adopted by Cullen in the eighteenth century and has persisted into modern times. The distinction of the tertian and quartan group of malarial infection from either of the above categories was, however, usually recognized.

¹ Sir Thomas Watson. "Lectures on the Principles and Practice of Physic," London, 1843. Vol. II, p. 669. A large part of Justus von Liebig's early work

(c) *Knowledge of Infection among Arabian Writers.*

The medical theories of the Mediæval and Renaissance periods were derived from two main sources. Firstly, they were formed by Greek medical works in more or less defective Latin translations. Secondly, they were molded by Arabian writings which were themselves, in the main, little but corrupted versions of the Greek works from which they ultimately derived. Latin translations of these Arabian writings filtered into Europe continuously from the eleventh to the sixteenth century. In spite of the revived interest in Greek among scholars of the fifteenth century, Arabian influence by no means passed into abeyance. The relative importance of Greek and Arabian writers at the time may be gathered from the following table of the number of editions of various medical writers, printed before the year 1500.

Hippocrates	0	} Greeks
Dioscorides	2	
Galen	1	
Rhazes	14	} Arabians
Mesue	18	
Avicenna	21	

Nor must it be considered that the influence of the Arabians stopped even with the close of the fifteenth century. Further editions of Mesue were issued during the next 100 years and the work was used in the formation of the first London Pharmacopeia, issued in the reign of James I; while the Canon of Avicenna served as a text-book and continued to appear in ponderous folio editions until the wane of the seventeenth century. It is therefore necessary to consider the Arabian doctrines of contagion in order to estimate the influences on Renaissance medical conceptions.²

was devoted to the subject of fermentation and paved the way for Pasteur.

² For the analysis of the views held by Moham-

Little is known of Arabic views in the pre-Mohammedan era on the subject of epidemics. It would seem that such phenomena were regarded as due to the direct and baleful influence of the Djinn, no attempt being made to analyze their nature further. With the advent of the Mussulman period this was changed. Mahomet himself appears to have halted between two views. During the early years that he had spent as a herdsman he had remarked that disease seemed to be conveyed from one animal to another, rather than imposed on the whole group from without. This observation, however, when extended to human epidemics was with difficulty reconciled with his later faith in the direct intervention of Allah in all human affairs. The confusion or perhaps fusion of ideas is found throughout Arabic medical literature. It is well illustrated in the "Book of the Pest" by the celebrated author, al-Bokhari (810-870 A.D.):

"The owner of a sound flock should not go near an infected flock. . . . If you perceive that the pest reigns in a land, enter not therein, but if you are in an infected country, pass not out therefrom. . . . The plague is a punishment from Allah and inflicted by his will. It has been created in pity for the sake of the true believers and it proceeds not from man. Therefore any man [to whom that fate may come] should die calmly in his own country knowing well that he endures what Allah has preordained; for him the plague is a martyr's crown."³

The advice thus offered was not in fact always applied by the Mohammedan hosts. Thus on the approach of an epidemic, Omar ben al-Khattab and the generals who succeeded him dispersed their soldiers in the

mountains or the desert and there they remained until the pestilence had spent its force.

However much the doctrine of predestination may be a Mohammedan dogma, its practical application has varied according to the theological complexion of place and period. Wise action such as that of Omar would especially appeal to such sects as the heretical Qadarites of Basra and their successors. These people considered that Allah, while determining the more sweeping and important world movements, did not exercise the same minute surveillance over the smaller details of life and thus they tended to become more anti-fatalistic. Under the reign of Motawahkil Jaafar Abu'l Farl (847-881) and his successors, there was a fatalistic reaction and many lives were sacrificed to the fanatical interpretation of the doctrine of predestination. The sale even of medical books containing heretical views was strictly forbidden. The works of Galen, however, fortunately escaped the ban, perhaps owing to their strongly expressed teleological views. They thus survived to earn the approval of the orthodox and to form the basis of Arabic medicine, so that Galen, the unbeliever, came to occupy a somewhat similar place in the affections of the followers of the crescent, that Virgil, the worthiest of the heathen, earned among the Christians.

Passing from the general tendencies that influenced Arabic medicine, we may consider the views on infection that arose among its professors. Already in the seventh century the Christian Ahron of Alexandria regarded epidemics as a result of the constitution of the air, a view clearly derived from Greek sources. Rhazes (died 932), in spite of his clinical acumen, contributed

medans on the subject of contagion we are largely indebted to Dr. E. Seidel. "Les Idées des Arabes du moyen-âge sur la contagion" in *La Revue médicale d'Égypte*, 1912, and "Die Lehre von der Kontagion bei den Arabern" in the *Archiv für Gesch. der Med.*, VI, 1913. We had ourselves made a somewhat exten-

sive research into the Arabian literature. We happened, however, to be in Germany on the outbreak of war in August, 1914, when our notes were seized by the authorities, who have hitherto refused to relinquish them.

³ Quoted from Seidel, loc. cit.

little to the subject of contagion though he introduced the element of "fermentation"⁴ also of Greek origin. He mentions among the diseases "which are transmitted from one person to another" lepra (? elephantiasis), itch, consumption and "pestilential fever." These are infectious "when one is shut up in a narrow house with those afflicted thereby or when one sits upon their windward side." Ophthalmia and smallpox he considered as also sometimes contagious.⁵

The earliest Arabic writer in whom a definite advance on these views is to be found is the Persian Haly Abbas (Ali ben Abbas—died 994). His works were translated and printed⁶ but their popularity was rather before than after the period of the invention of printing, when they became almost entirely superseded by the writings of Rhazes and Avicenna. Haly Abbas distinguishes clearly enough between wind-borne diseases and those which are simply "infectious."⁷ In the latter group he places leprosy (goudham), scabies, phthisis, smallpox, and ophthalmia—all diseases that are conveyed by intercourse with an infected person.⁸

As regards influence on European medical thought, the most important of all Arabic writers is Avicenna (980–1037), whose ponderous Canon enjoyed a vogue from the twelfth to the seventeenth century and has probably been read more than any other text-book of medicine. Avicenna following Galen recognized the contagious quality of "lepra."⁹ He regarded "varioli" and "morbilli" as "of all diseases the most contagious."¹⁰ He laid, however, far more stress on the factors of "fermentation" within the

body and of corruption of the air without than on any contagious element of disease, and thus reproduced the well-known views of the ancients on the subjects of epidemics,¹¹ and served to stereotype them for many centuries.

As to the existence of contagion, the western Avenzoar (died in Spain, 1162) was more definite than his Bokhariote predecessor Avicenna. Avenzoar¹² thus gives to contagion a chief place among the causes of "lepra":

"There occurs at times in the bodies of men a very bad cancer which is lepra: . . . and this arises mostly from nearness to lepers and intercourse with them."

Again, as to the influence of air he says,¹³ citing Hippocrates that:

"Hot and moist air is injurious because in this state the air is more apt to receive the putrefaction of others; and those of the same kind (as the infected) are more especially apt to receive this putrefaction."

Again¹⁴:

"If, in the course of an epidemic, some persons die suddenly, the cause is the putrefaction and the malignity of the air. For it is possible to live for some days without food or drink, but not for one hour without air suitable to be breathed."

In the same chapter he clearly enunciates the miasma doctrine.

"But corruption of the air, pestilence and epidemics are caused by stagnant waters without flow, which teem with

⁴ Rhazes, Liber de Pestilentia (i.e. mainly Variola). cap. 1.

⁵ Ibid. Al Mansor. Lib. IV. cap. 24.

⁶ At Venice in 1492 and at Lyons in 1523.

⁷ Haly Abbas, lib. V, ch. 10 and 11 of the Latin edition of 1523.

⁸ Seidel, loc. cit., quoting from the Arabic. We are unable to verify this statement from the Latin translations.

⁹ Avicenna, Liber canonis, Lib. 4, fen. 3, tr. 3. cap. 1.

¹⁰ Ibid. Lib. 4, Fen. 1, Tr. 4, cap. 6.

¹¹ Ibid. Lib. 4, fen. 1, tr. 4, cap. 1.

¹² Avenzoar, The Tzir, Lib. II, Tr. VII, cap. 12.

¹³ Ibid. Lib. III, tractatus III, cap. 1.

¹⁴ Ibid. Lib. III, tractatus III, cap. 2.

fecal substances and effervesce, putrefy and smell, thus giving birth to fevers, agues and mortal apostemata. . . . This epidemic which arises from the putrefaction of evil waters is worse than all others."

Averrhoes (died in Spain in 1198) in his "Colliget" takes a view of the nature of contagion practically identical with that of Avenzoar, and his medical work contains no marked original elements. Indirectly, however, he did much to establish a rational doctrine of contagion by his effective philosophical opposition to determinism. This enthusiastic follower of Aristotle thus succeeded in founding a school of thinkers who sought the direct physical causes of disease and epidemics just as for other natural phenomena, and thus paved the way for the methods of modern science. The doctrine of Averrhoes took root in Mohammedan Spain, notwithstanding persecution, and with the eminent writer Ibn al Khatib (1313-1374), who endeavored to completely liberate prophylactic methods from the dead weight of philosophical determinism, we reach the high-water mark attained by the Arabian writers in this respect. As, however, Ibn al Khatib's work was not translated or printed until the nineteenth century,¹⁵ his views exercised little influence in Europe. He is especially interesting because he clearly believed the doctrine of fomites and is thus to be ranked among the predecessors of Fracastor. For prophylactic treatment of the plague he advises, first "a disinfection of the circumambient air by good cold smells, by flowery perfumes, etc.," and secondly "the avoidance of the places where one may suspect corruption from those sick and dead of the disease, *their clothes, vessels and utensils*, avoidance of entry into an infected house or of approach to the neighborhood of the sick, or, if this is impossible,

the visit must be rapid and accompanied by every precaution." He proceeds with a philosophical and rational exposition of his views on infections, and deals with objections not only on theoretical grounds but also on the basis of experience.

A writer of the distinction of Ibn al Khatib must have had many disciples, and when the stores of unexplored Arabic medical works come more fully within the purview of the Western reader, his theories and views will probably be found to be no isolated phenomenon.

(d) *Knowledge of Infection in Mediæval Europe.*

In no age and in no part of the world have epidemics had a larger influence upon social conditions than in Western Europe between the middle of the fourteenth and the beginning of the sixteenth century. That stretch of time opens with the appalling visitation of the Black Death of 1347-9, and closes with the epidemic outbreaks of typhus, syphilis and plague that swept repeatedly over the continent from 1490 to 1540. Between these two larger groups of visitations were many others of which the individuality is sometimes obscured by their frequency and tendency to overlap. Time and again influenza, plague, typhus, small-pox, syphilis and sweating sickness devastated the overcrowded mediæval towns, often spread by movements of armies or social upheavals, or associated with famines, earthquakes, floods or other disasters.

The general medical ideas of the period were derived mainly from Arabian sources, but in part more directly from Greek medicine. In the matter of such immediate and vital importance as epidemics, however, the Middle Ages were not quite so devoid of originality nor so wholly dependent on outside sources as in most other branches of medicine.

The repeated onset of epidemics gave rise to a semi-original plague literature, mostly

¹⁵ See M. J. Müller in *Sitzungsberichte der königlichen bayerischen Akademie der Wissenschaften zu München*, June, 1863.

in the form of tractates a few folios in length. This tractate literature was so extensive and popular that there is no large general manuscript collection in Europe that does not contain examples. All languages are represented. The mass of these plague tractates are in Latin, but examples are known in English, French, Provençal, German, Italian, Flemish, the Scandinavian languages, Hebrew, Arabic, Bohemian, Spanish and Portuguese. This tractate literature, which needs more extended study, yields us the best picture of the mediæval beliefs as to the nature of contagion. Many of the plague tracts point out that the ancients had far less experience of the pestilence than was afforded to more modern writers, and that contemporary works were therefore more valuable than the classics of medicine in regard to the treatment of this disease.¹⁶

In the medical literature of Greek and Arabian origin the idea of contagion is never so much emphasized as in some of the plague tractates written between 1350 and 1500. There was indeed a gradual strengthening of the belief in infection throughout the Middle Ages. Furthermore the distinction between infection by contact and infection at a distance that had been but lightly touched by the ancient writers, assumes progressively a more and more important rôle until finally at the hands of Fracastor the whole group of ideas is submitted to a true scientific analysis.

The three methods of infection, by contact, through the air and by means of fomites, seem to have been recognized in the earlier Middle Ages. The conception is

clearly represented in verses of the school of Salerno, of the tenth or eleventh century,¹⁷ where it is urged that in smallpox, "Children should avoid touching the contagium of the disease: (a) the sick person, (b) the breath of the sick, (c) the clothes, the coverings, the garments and such clean bodies as he may have infected with his hand."

A belief in the three types of contagion is implied in a number of writings which appeared in the fourteenth and fifteenth centuries. Thus in a "plague regimen" put together by Cardo of Milan in 1378 we read that one "must take the greatest care in approaching a plague patient since the air itself is contagious," deriving this quality from the sufferer.¹⁸ Again Bartolommeo Santa Sofia (*circa* 1464) assures us that "a man may carry the plague even though he have it not,"¹⁹ and from an official publication of the town of Nuremberg issued in 1496 to guard against the spread of syphilis, we learn that clothes were regarded as capable of carrying that infection.²⁰

Views such as these are reflected in the writings of Boccaccio whose *Decameron*, which first appeared about 1350, is based on the isolation of its actors during the Black Death of 1348. Boccaccio in his introduction "to the ladies," writes that:

"The disease, by being communicated from the sick to the well, seemed daily to get ahead, and to rage the more, as fire will do by laying on fresh combustibles. Nor was it given by conversing only, or coming near the sick, but even by touching their clothes, or anything that they had touched. . . . Such I say

¹⁶ The plague tractate literature has been recently studied by Dorothea Waley Singer, "Some Plague Tractates," *Trans. of Royal Society of Med. Historical Section*, 1916, and K. Sudhoff whose "Pestschriften aus den ersten 150 Jahren nach der Epidemie des 'schwarzen Todes,' 1348," has been in progress in the *Archiv für Gesch. der Med.* since 1910.

¹⁷ A. C. Klebs, "The Historic Evolution of Variolation," *Johns Hopkins Hospital Bulletin*, Baltimore,

1913, XXIV, 70-83. S. de Renzi, "*Flos medicinæ Scholæ Salerni*," Naples, 1889.

¹⁸ Karl Sudhoff, "Pestschriften aus den ersten 150 Jahren nach der Epidemie des 'schwarzen Todes,' 1348, *Archiv für Geschichte der Medizin*, Bd. V, 5, 1913, p. 319. ¹⁹ *Ibid.*, p. 352.

²⁰ Karl Sudhoff, "Die ersten Massnahmen der Stadt Nürnberg gegen die Syphilis in den Jahren 1496 und 1497," *Archiv für Dermatologie und Syphilis*, CXVI, Heft 1, 1913, p. 3.

was the quality of the pestilential matter, as to pass not only from man to man, but, what is more strange and has been often known, that anything belonging to the infected, if touched by any other creature would certainly infect and even kill that creature in a short space of time. One instance I took particular notice of, namely that the rags of a poor man just dead, being thrown into the street, and two hogs coming by at the same time and rooting amongst them and shaking them about in their mouths, in less than an hour turned round and died on the spot. These accidents, and others of the like sort, occasioned various fears and devices amongst those people that survived, all tending to the same uncharitable and cruel end: which was to avoid the sick, and everything that had been near them, expecting by that means to save themselves."

About the end of the fifteenth and the beginning of the sixteenth century, great stress was laid on these different methods by which infectious disease might be conveyed, although the conception was often obscured by the importance attached to the factors of predisposition and of atmospheric influence. Thus in 1497, Alessandro Benedetti²¹ writes that:

"Four factors by which bodies affect each other [with the plague] have to be considered: (1) the actual strength of the infection, (2) the disposition of the patient, (3) the nearness of the two bodies, and (4) the duration of exposure. . . . And so it comes about that while some are smitten down, others linger on in sickness and yet others recover. . . . *It is indeed remarkable how linen garments especially can long preserve the pest.* I have heard

how, in my father's time at Venice, a suspected mattress was put by in a gentleman's house, and seven years later the mistress of the house ordered it to be split open, and the servant who did this was straightway seized with the plague."

The same four factors are repeated more definitely by Widman who, writing in 1501, tells us²²

"That we have to consider in pestilence, First, Susceptibility (*passi dispositio*) and what bodies are subject to pestilence. Secondly, the strength of the acting cause and what is the infective agent in the air, in what way and with what force it acts. At what season this evil quality is in the air which so strongly tends to the corruption of the human frame. . . . Thirdly, whether there is actual contact or merely proximity of the agent to the patient, for it appears that air may become pestilential in the same manner [as another object]. . . . And Fourthly, there is the question of the duration of exposure."

Benedetti and Widman are typical writers of the period, whom we have selected to show what conceptions were available to Fracastor before the publication of his great work.

An obscure writer, Remacle Fuchs of Limburg (1510-1587), discloses an outlook on infection which even more definitely approaches that of Fracastor. His work on the morbus gallicus or "Spanish disease," as he called it, appeared in 1541.²³ We may quote him also as giving the contemporary pathology of fevers and illustrating the usual stress laid on obstruction of the humors. Fuchs tells us:

said to have been one of the first physicians in Europe to have openly advocated the use of mercury in syphilis.

²³ Remacle Fuchs of Limburg, *Morbi hispaniol, quem alii gallicum alii neapolitanum appellant*,

²¹ Alexander Benedictus, "De observatione in pestilentia," Venice, 1497, ch. III.

²² Johannes Widman, called also Salicetus and Mechinger, Meichinger and Mochinger, "Tractatus de pestilentia," Tübingen, 1501, Ch. I. Widman is

"The disease can be contracted merely by contact and mutual intercourse, but above all by sleeping constantly with infected persons or by touching their garments, underclothes or linen which have come into contact with the ulcerated places. For the corrupted humors, passing through the porosities of the tissues, are carried by the force of the pulse to the surface of the skin. And if, owing to their adhesiveness and density, the humors cannot be insensibly exhaled, they corrupt the skin by their acid and biting quality and give rise to ulcers from which flow virulent matter. This clings to neighboring parts and corrupts and infects everything disposed to putrefaction. So diseases, such as lepra, scabies, variola and pestilential fever and putrid abscesses pass from one person to another."

Remacle Fuchs speaks also of the "seminarium" of disease, a word which he uses to translate the *σποραδικόν* of Galen.²⁴

The doctrine of the three degrees of infection received full official recognition in Paris during the pestilence of 1533, when a police ordinance was printed and posted over the town containing instruction for the conduct of the citizens as well as of the officials. In this ordinance the conveyance from house to house of all substances likely to act as fomites, such as bedding and clothes of the sick, was strictly forbidden. Special medical attendants were appointed for the plague-stricken and were prohibited from attending those suffering from other diseases lest they might convey the infection.²⁵ Thus the idea of the various degrees of infection and especially of infection by fomites was familiar both to medical men and even to the laity before Fracastor formulated his doctrines in 1546.

curandi per ligni indici quod Guayacum vulgo dicitur decoctum exquisitissimum methodus . . . Paris, 1541. Quotation from Chapter VI.

²⁴ Remacle Fuchs, *loc. cit.*, ch. 1.

V. THE CONTENTS OF THE "DE CONTAGIONIBUS" OF FRACASTOR.

"*The Different Types of Infection.*" (Book I, Chapter 2.)

"The essential types (*prima differentia*) of contagion are three in number:

(1) Infection by contact only.

(2) Infection by contact and by fomites as scabies, phthisis, areæ, leprosy (elephantiasis) and their kind. I call fomites such things as clothes, linen, etc., which although not themselves corrupted, can nevertheless foster the *essential seeds* (*seminaria prima*) of the contagion and thus cause infection.

(3) Finally there is another class of infection which acts not only by contact and by fomites but can also be transmitted to a distance. Such are the pestilential fevers, phthisis, certain ophthalmias, the exanthem that is called variola, and their like."

The distinction of the degrees of infection is, as we have seen, by no means original to Fracastor, although the admirable clearness with which he classifies and discusses them is all his own. Notably the conception of fomites is encountered in many earlier writings. The actual term *fomes*, however, may have been introduced by Fracastor himself to express the special substance or carrier in which the germs of disease may lurk. The word is used by Virgil to mean a "touchstone" or "tinder." It is from the same root as *fovere* which, meaning originally "to keep warm," came to imply in poetic usage "to keep warm for the winter," "to hibernate," and so "to lie hidden or latent," a shade of meaning which our author has transferred to his own special use of the word.

Infection by Contact Alone. (Book I, Chapter 3.)

"The infection which passes between

²⁵ This ordinance, a copy of which is now in the British Museum, has been translated and in part published by Charles Singer. *Annals of Tropical Medicine and Parasitology*, Vol. VI, p. 392, 1912.

fruits is markedly of this kind, e.g. as from one cluster of grapes to another and from apple to apple. . . . The putrefaction that thus passes from one fruit to another is really a dissolution of the combination (*mistionis*) of innate heat and moisture by the process of evaporation.

The humidity [thus set free] softens and relaxes the parts and makes them separable, and the heat effects the separation. . . . I regard the particles of heat and of moisture separately, or in the case of moisture, perhaps in *combination* as the essential *germs* of the resulting putrefaction (*esse principium et seminarium ejus putrefactionis*) I speak here of the *particles of humidity in combination* because in the evaporative process of putrefaction, it often happens that the very minute particles mingle themselves and thus generate new corruptions. This mingling or *commistion* is indeed especially favorable for the propagation of putrefactions and infections."

The word *mistio* or *commistio* is a technical term of mediæval science and is of Aristotelian origin. It is used to denote the manner and proportion in which the *qualities* or the *elements* are mingled in any body. This must not be taken to imply a belief in "elements" in the modern sense of the word, a conception which perhaps first finds no place in scientific literature earlier than the works of Robert Boyle in the seventeenth century.²⁶ In earlier writings, the concept of the *elements* implies rather the separable qualities or attributes which can be traced back to Aristotle's sets of opposing qualities. (1) heat and (2) cold, (3) dryness and (4) moisture, to which were sometimes added (5) rareness and (6) density. From the compatible binary combination or *mistio* of the first four of these six qualities were derived the four elements fire, air, water and earth. Thus:

<i>elements.</i>	<i>qualities.</i>
fire	is hot and dry—rare
air	is hot and moist—intermediate
water	is cold and moist—intermediate
earth	is cold and dry—dense

These combinations thus form a series with *fire*, exhibiting especially the *quality of rarity* at one end and *earth* exhibiting especially the quality of *density* at the other. In each element, therefore, occurs a definite "commistio," dissolved only by the separation of one of the essential "qualities" from its fellow. This "commistio" or as it is sometimes termed "complexio" is made more complex by the fact that in matter as we encounter it, all the four elements are themselves supposed to be mixed in various proportions.

Qualities such as moisture and heat were thus regarded as having an existence apart from the material in which they exhibited themselves. The Mediæval and Renaissance scientist was not as accustomed as we are to distinguish vital from purely chemical phenomena. He therefore did not hesitate to import the same ideas directly into the realm of physiology. The quality *heat* was thus identified with the warmth of living bodies. This warmth or innate heat was given off, as needed, from the place of its origin and storage, the heart. For health, a definite relationship and combination between heat and moistness (among other qualities) was considered necessary. If this combination and relationship broke down, disease resulted. At death, the innate heat departed, a conception intimately related to the "abdication of the Archeus" of later writers. The sodden state of the tissues of a corpse was in like manner regarded as a dissolution of the relationship of moisture and innate heat. A similar but less marked dissolution of the same relationship was supposed to be exhibited in the oedematous and watery limbs of the dropsical or as a diathesis in *moist* and *pblegmatic* persons. In other conditions, again, the qualities of

²⁶ Robert Boyle, "The Sceptical Chymist," First edition, London, 1661.

hotness and dryness were considered to be in excess. Such were phthisis and continued fevers in which the patient wasted while his temperature was raised. All these conceptions can be easily traced back to their Greek origins.

Infection by Means of Fomites. (Book 1, Chapter 4.)

"It may be questioned whether the infection by a fomes is of the same nature (*principium*) [as infection that acts only by actual contact]. The nature of infection by a fomes appears, indeed, to be different since having left its original focus (*primo infecto*) and passed into a fomes it may there last for long unchanged. It is, indeed, wonderful how the infection of phthisis or pestilential fevers may cling to bedding, clothes, wooden articles, and objects of that kind for two or even three years, as we have ourselves observed.

"On the other hand those minute particles given off by a body affected with putrefaction do not appear to preserve their virulence for long and on that account are not to be regarded as of identical essential nature (*idem principium*) either with those of fomites or with those that act by contact alone. . . . Not all substances are liable to become fomites, but only those that are porous and more and more or less calorific, for in their recesses the seeds of contagion can lurk hidden and unaltered either by the medium itself or by external causes, unless these are excessive, e.g. they cannot withstand fire. Thus, iron, stone, and cold, impervious substances of this kind, are hardly likely to act as fomites; on the other hand linen, cloth and wood are much more apt to do so."

Fracastor here regards the "seeds of disease" as comprising two distinct groups. Infection by contact, he has already explained as comparable to what we may call coarse chemical action. In the case of infec-

tion by fomes, on the other hand, he presupposes invisible particles which convey the condition and which are capable of lurking in the recesses of a pervious substance. It is to these that he applies the term "semina." If we seek for a parallel in modern scientific conceptions we may perhaps compare the action of these to catalytic action, provided always that we remember that Fracastor does not draw the distinction between chemical action and the action of living organisms which is a commonplace with us.

Infection at a Distance. (Book 1, Chapters 5-7.)

"It is well known that the pestilential fevers, phthisis and many other diseases are liable to seize on those who live with the infected, although they have come into no direct contact with them. It is no small mystery by what force the disease thus propagates itself. . . . For this type of contagion appears to be of quite a different nature and to act on a quite separate method to the others. . . . Thus a patient with ophthalmia may give his disease to another by merely looking at him (*per vocatas species et simulacra rerum*). . . . This well illustrates the rapid and almost instantaneous penetrative power of this type of contagion . . . which may be compared to the poisonous glances of the catablepha."

The *catablepha* is one of the few instances in which our author describes an event which we should regard as miraculous. The description of the creature doubtless reached him through Pliny²⁷ where we read:

"In the eastern part of Ethiopia is the source of the Niger and, as many think, of the Nile also. There dwells a savage beast called the Catoblepas, small in size and slow of movement, and with a head of disproportionate greatness and only with

²⁷ C. Plinius Sec. Naturalis historia, VIII, 21.

difficulty borne so that it carries it always on the ground. The animal has eyes which are fatal to mankind, for all on whom it looks fall suddenly dead. The basilisk has the same power."

Before the invention of the microscope and the resulting discovery of minute living things it was just such analogies that afforded suggestions for the mysterious conveyance of infectious disease. Throughout the sixteenth and the following century, the works of the ancients, as well as travelers' tales of newly discovered countries, were ransacked again and again to provide such analogies for the process of infection. The last hours of many a wretched sufferer must have been embittered by the sordid fear of his companions lest a touch or even a glance or a word from him might convey some dread disease.²⁸ The kindred belief in the evil eye lingers yet in Fracastor's country.

In the passage above quoted, Fracastor meets with the first great difficulty of the *germ* theory, the passage of infection from one body to another through intervening space. He hastens to assure us, however, that "the causes of infection acting at a distance need not be referred to occult influences" and proceeds to elaborate a suggestion as to how "the seeds of contagion may be carried to a distance and on to the world at large" (Chapter 7). This doctrine we may call the *theory of halitus* or *doctrine of exhalation*. It was very popular in the sixteenth century and was further elaborated by Hieronymo Cardano (1501-1576) and Andrea Cesalpino (1519-1603). The theory supposes that all bodies, and especially the more moist and volatile, are constantly giving off particles that may make themselves appreciable to the senses as vapors or odors. If the

halitus of an onion—which we can appreciate by the sense of smell—can produce a watery discharge from the eye, why should not the halitus of an ophthalmia, acting similarly at a distance, produce a purulent discharge? Furthermore many such substances may have the properties of poisons or of remedies. Men may be suffocated by vapors or they may be revived from fainting by the minute particles that make up subtle and acrid smells. There is this difference between such exhalations and those of disease; the former act at once, the latter after an interval or incubation period. Here Fracastor has an hypothesis ready:

"One method of penetration of the seeds of infection is by propagation and generation (*sobolem*). For the seeds attach themselves to those humors with which they have an affinity and produce others like to themselves, until at last the whole mass and body of the humors is affected. Another method is by attraction and entering by inspiration or by dilatation of the vessels. For when the admixed seminaria are sucked in with the breath, though it is easily inhaled it is not so readily exhaled and may thus adhere to the humors and even the spirits which, expelling that which is contrary and inimical, send them to the heart."

The Affinities (Analogiæ) of Infections.
(Book 1, Chapter 8.)

"The affinities (*analogiæ*) of infections are numerous and interesting. Thus there are plagues of trees which do not affect beasts and others of beasts which leave trees exempt. Again among animals there are diseases peculiar to men, oxen, horses and so forth. Or, if separate kinds of living creatures are considered, there are diseases affecting children and young people from which the aged are exempt and *vice versa*. Some again only attack men, others women, and others again both sexes. There are some men that walk unharmed

²⁸ A good collection of stories concerning the miraculous conveyance of disease by glances, etc., may be found in a work by the learned Alexander Ross, the opponent of Sir Thomas Browne, entitled "Microcosmography," London, 16.

amid the pestilence while others fall. Again there are infections which have affinities for special organs. Thus ophthalmia affects only the eye. Phthisis has no effect upon that most delicate organ but acts especially upon the lungs. Alopecieæ and Areæ confine themselves to the head."

Is Infection a Sort of Putrefaction? (Book 1, Chapter 9.)

"We here consider whether all infection is a sort of putrefaction and also whether putrefaction is not itself infectious. . . . Now with Rabies have we not infection without any putrefaction? Again, when wine becomes vinegar have we not infection without putrefaction? For, if left to putrify, it is later that it becomes fetid and undrinkable—the sure signs of putrefaction—and thus differs from vinegar which is pleasant to take and is indeed resistant to putrefaction.

But it must be remembered as regards putrefaction that sometimes there is but a simple dissolution of the combination (*mistio*) of humidity and innate heat without any new *generation*—we then speak of it as *simple* putrefaction. Sometimes on the other hand, in the process of this dissolution, there is a true animal generation or generation of some substance definitely organized and arranged (*generatio aliqua provenit aut animalis aut alterius quod formam unam et certam habet et misionis rationem, ac digestionem suam*).

When there is simple putrefaction, there is no new generation but a feter and a horrible taste arise . . . but when, on the other hand, there is production of a new generation, there is neither the abominable smell nor taste but a definite redistribution of the qualities (*digestio ordoque partium pro certa forma*). As with wine . . . so also with milk and with phlegm, the first stage of putrescence is acidity. Similarly with Rabies, we must suppose a

preliminary stage in which there is a certain amount [of the same preliminary type] of putrescence. It is, however, latent because putrefactions which take place in the living animal do not make themselves immediately apparent. It is an observed fact, however, that dogs which are becoming rabid are usually seized with febrile symptoms. If, therefore, we regard the matter inductively (*si igitur in omnes contagiones inductio fiat*), we shall consider that all infections may be reduced ultimately to putrefaction. . . . Furthermore, all putrefactions are liable to produce putrefactions of like kind to themselves, and, if all infection is putrefaction, *infection in the ordinary sense of the word is nothing else than the passage of a putrefaction from one body to another either contiguous with it or separated from it.*"

The use of the word *generation* in sixteenth century science is often puzzling. The term is constantly used by chemists and alchemists, e.g. Paracelsus, Campanella and Comenius, without any thought of attributing specifically living properties. The conception is adopted from the Aristotelian system in which *generation* is the equivalent of the coming of a thing into being and is the opposite of decay or *corruption* which is the passing of a thing out of being, both being regarded as varieties of *motion*, a term that also had for Aristotelians a meaning wider than is now given it.²⁹ We must therefore note again that a vitalistic interpretation must not be placed on the word *generation* as used by Fracastor.

In What Respects Infections Resemble Poisons and in What They Differ. (Book 1, Chapter 11.)

"There are certain infections which resemble . . . poisons, since, like them, their venom lies insidiously latent until,

²⁹ Aristotle, "De motu animalium," Sect. 5, and the "De corruptione et generatione."

having reached the heart they kill the animal and on this account certain fevers are frequently called *venomous*. But there is really a great distinction between them. *Poisons cannot in themselves produce putridity, nor can they reproduce in a second body such seeds and essence of their nature as may be in that primarily affected. Those who are poisoned do not infect others.*

Now of poisons there are two kinds. The one acts through its spiritual quality. Such is the poison of most serpents and glance of the *Catablepha*. The other acts through its material quality."

Concerning Other Differentiæ of Infections.
(Book 1, Chapter 12.)

"It is manifest that the seeds of contagion arise first in ourselves. This takes place not only in scabies, achores, and phthisis but even in the pestilential fevers. The production of these is as follows: the corrupted humors being obstructed are delayed and finally stopped, they give rise to these seeds. That these [seeds] are the carriers of the contagion we have said above, and that they are the first origin of the disease there can be no doubt. It is a more vexed question whether in one secondarily affected, there is the same putrefaction of obstructive and corruptive origin or no. For if not how do the new seeds arise which enable a third person to be infected? But if this putrefactive process does ensue, how can it arise when the same causes are not acting in the second body that were acting in the first? . . .

To this it must be answered that there is indeed produced in the second body an obstructive and corruptive putrefaction . . . and that this process is produced by the clogging effect (*inbæsiõnem*) of the same seeds. Thus the essence (*principium*) and seeds of the disease were exactly the same in the second body as in the first and it may be considered that the force of the disease lies in those seeds, since

they have the power to propagate and reproduce their own kind."

In order to explain the first origin of a fever, Fracastor associates with his view of putridity of the humors, the current theory of "obstructions" of the humors. The humors in health were represented as perpetually flowing, and many pathological appearances such as abscesses, pulmonary tubercles, lymphatic nodules and fibrotic areas were interpreted as due to the interruption of the flow and the consequent humoral change, which led to their solidification.

"As has been said there is a power in these seeds that they may multiply and propagate their like. Those causes then which produce obstructions, plethoras and corruptions of the humors by which they become fouled, putrified and occluded give rise to seeds that can convey the infection to others, whether the same causes and dispositions be acting in those others or not, whence they may carry the same contagion to a second and third.

But the essence and seminaria of contagion may also come to us from an extrinsic source. Thus we see diseases spreading in the population as a whole. *Epidemics* as they are called, of which some, though not contagious, may affect many cities or regions and are then called *communes*; others again of these are contagious and pass from one to another without atmospheric disposition, these are called *non communes*."

Thus Fracastor also declares his belief in the spontaneous generation of the semina or rather he assumes it as a matter of course. Since no question of universal biogenesis such as that professed to-day had or could have reached Fracastor, the whole question as to whether he regarded his "seeds of disease" as living or not has very little meaning. The lower animals were regarded by him and his contemporaries as frequently

"generated" from mud and slime, a belief often referred to Aristotle but which could be traced with more reason far beyond him and back to the realm of primitive belief. For writers of the sixteenth century the gap that was later recognized between the organic and inorganic world did not exist, and the cleavage between materialists and vitalists had therefore not assumed any definiteness.

The chapter continues with an interesting reference to an epidemic of typhus and another of foot and mouth disease.

"That pestilence which swept through Greece and is described by Thucydides was contagious and so were those which have in our time appeared in Italy and are by some called *lenticulæ*, by others *puncticula*. We may refer also to the extraordinary infection of the year 1514 which broke out in cattle which appeared first at Friuli and thence spread to our district. The beast would first refuse food without any reason that could be discerned in the mouth by the herdsmen, then a roughness with little pustules became distinguishable on the palate and throughout the mouth. If the infected beast was not segregated without delay it would infect the whole herd. Slowly the tetter (*labes*) would reach the feet. If a change then set in, they almost all recovered, but if it did not they mostly died."

There follows a declaration in the belief of the celestial origin of some epidemics and a statement of the value of astrology.

"Of the causes which act from without the most potent is air itself though waters and marshes have also their influence. Now it must be remembered that air varies in quality with heating, cooling, drenching, and drying, and not only so but vapors pass into our bodies both simple and also containing seminaria of contagion. . . .

It should perhaps be considered whether any contagions are derived from the heaven and from the stars since astrologers have often foretold future diseases and epidemics. At any rate it appears that they foretold the syphilis or morbus gallicus many years before it appeared."

It may be at first startling to find a belief in astrology expressed by one so temperamentally sceptical as Fracastor. It must be remembered, however, that in the first half of the sixteenth century the influence of the planets on human affairs was the working hypothesis of the advocates of *Naturalism*. It was a view of Nature that stood in broad opposition to the theocratic teaching of Christianity. The theory thus occupied a place among the naturalistic school somewhat similar to that filled by the Theory of Evolution in the last third of the nineteenth century.

Thus closes the first book of the *De Contagionibus*. With the two remaining books we are hardly concerned here. The second describes the varieties of infectious disease known to Fracastor and includes phthisis. The third deals with remedies. We may terminate our extracts with Fracastor's description of epidemic typhus which he tells us broke out with especial virulence in his country in 1505 and 1528, though it had been known previously in Cyprus and the neighboring isles. His description of this disease gives a fair idea of his clinical method.

"This fever is infectious but it is not conveyed through the air (*ad distans*) nor by fomites but by the actual handling of the sick. The onset as with all pestilential fevers is insidious (*placidus*) and mild so that the patient hardly desires to see a doctor and thus many physicians have been misled looking to an early resolution of the malady. Soon, however, the signs of a malignant fever put in an

appearance, and after the manner of such disease, the patient may not feel marked febrile symptoms yet constitutional disturbance (*perturbatio interne*) becomes obvious. There is prostration and lassitude of the whole body, as though he were exhausted. He lies supine, the head aches, the senses are dulled, the mind wanders, the eyes are reddened and he chatters constantly.

"The urine is at first copious and clear, later it becomes ruddy and turbid like pomegranate wine. The pulse becomes small and slow, the motions corrupt and fetid. About the fourth or seventh day, reddish spots appear on arms, back and chest. Often they are punctiform like flea bites or larger and of the size of lentils.

"There is little or no desire for drink but the tongue is covered with sordes. Some patients are somnolent, others restless, in others the conditions alternate. This state continues for seven or fourteen days or even longer. In others, there is retention of urine, a sign of the utmost gravity. Women seldom die of this disease, old people seldomer and Jews never. It chiefly carries off the youthful and especially the gentle, contrary to the pestilences which rage among the poorer classes. The following are of evil prognosis:

"If the patient feels prostration at the onset of the disease, if, when he be given a medicine, the result is out of proportion to the dose, if no relief comes from the crisis (we have seen a case where three measures of blood burst from the nose and shortly after the patient yielded up the ghost). It is an ill sign if there is retention of urine, if the eruption does not appear or is but slight or if it is livid and very spotty. If all or many of these are present, a fatal issue is certain."

VI. THE SOURCES OF FRACASTOR'S SEMINARIA HYPOTHESIS

The ultimate source of the seminaria

hypothesis expounded by Fracastor's work is to be sought in the atomic theories of Democritus and other early Greek writers. This atomistic view of matter was developed by Epicurus and his followers, as well as by their opponents of other schools. In the hands of Lucretius, atomism is very definite but is associated with a conception of *growth* or *development* in nature, whereby many things are regarded as arising from "seeds" or *semina* by the attraction to these *semina* of other material particles.

In spite of the opposition to Epicureanism, of the non-materialistic schools of later Greek thought, views on the atomic nature of matter were largely absorbed by the Gnostics, Basilidians and Neoplatonists: although, among all these sects, the philosophical necessity of deriving the Universe in some way from the ultimate divine essence or *logos* enforced the addition of the element of *generation*, an idea that is excluded in the system of Lucretius. Thus among these mystically inclined sects we find the conception of the material universe as a whole and also its constituent parts arising in turn from such *seeds* planted by the godhead. In a Gnostic work of the third century attributed to Hippolytus, we read how before the Universe yet was:

"The seed of the cosmos had all things in itself; just as the mustard-germ gathers together in the tiniest point and holds at the same time—roots, stem, branches, and leaves, the countless products of the one plant's germs, when other and still many other plants shed in turn their seeds," and the same writer speaks repeatedly in the same phrases as Lucretius but with a different meaning of "the seed power of the seeds of every kind of thing that is in this material world."³⁰

³⁰ See E. Miller "Origenis philosophumena," Oxford 1851 and L. Duncker and F. C. Schneidewin, "S. Hippolyti Ref. Om. Hær," Göttingen, 1859. The work is translated by G. R. S. Mead in "The Quest," V, 1, p. 58, Oct. 1913.

Such Gnostic or Neoplatonic conceptions were seized by St. Augustine (354-430), who transmitted them to later times. Augustine considered that God had deposited in matter a hidden treasure of active forces. These were the *seminal principles* or *rationes seminales*,³¹ whose successive germination in the womb of matter produce the different species of corporeal beings. There was, he considered, a distinct germ corresponding to each natural kind or species of body.³² This Augustinian conception lasted right through the Middle Ages. The saintly mystic St. Bonaventure (died 1274) had recourse to these *rationes seminales* in order to distinguish mere transformations of natural substances from creation and annihilation,³³ and the same position was assumed by Albert the Great (1193-1280), who in this respect deviated from the Aristotelian notion of primal matter purely potential. The works of both Bonaventure and Albert were very frequently printed in Italy in the latter fifteenth and early sixteenth centuries.

But there was another and more direct source of the doctrine of *seminaria* than either the Church fathers or the scholastic doctors that lay open to a sixteenth century humanist. The work of Lucretius himself, neglected throughout the Middle Ages as Epicurean and antitheistic, had been discovered by the scholar Poggio as early as 1418. The first printed edition of the "*De rerum natura*" appeared at Brescia in 1473 and it was reprinted in Fracastor's own city of Verona in 1486. Moreover, Navageo, Fracastor's most intimate friend and a fellow pupil of Pomponazzi, reedited Lucretius for the Venice Aldine edition of 1516. The atomic theory of Lucretius was thus quite familiar to Fracastor.³⁴ Now in the *De rerum natura* we may find actual refer-

ence to the "seeds" of diseases, and although these Lucretian seeds were by no means identical with those of Fracastor, it may be safely assumed that the Renaissance writer owed a large element in his conception to his Epicurean predecessor. "I will explain," writes Lucretius, "the law of diseases" . . .

"I have already shown that there are seeds of many things helpful to our life, and there must also be many that fly about conducing to death and disease. When these by chance happen to gather together and disorder the atmosphere the air becomes distempered."³⁵

Again in another part of the poem the disease of erysipelas is described as arising from such seeds.³⁶

Fracastor's "seeds" of disease combine some of the qualities of the "semina" of Lucretius with the "seeds" of the species of things in the patristic writings. It is noteworthy that, in setting forth his seminal hypothesis, Fracastor does not seem to consider that he is making any especially original contribution. He rather assumes a knowledge of "semina" on the part of his readers and does not attempt to explain their essential nature. It is on this application of the theory rather than on the theory itself that he spends himself, and it is Fracastor's specific use of the terms "semina" and "seminaria" which was so pregnant with suggestion in his own and the following centuries.

VII. KINDRED HYPOTHESES OF SOME OF FRACASTOR'S CONTEMPORARIES

With a Discussion of the Influence of the Doctrine of Seminaria

The sources from which we have suggested that our author derived his views

rerum," Ch. 5. "De attractione et motu similium ad similia."

³⁵ Lucretius *De rerum natura*, Lib. VI, line 1090 et seq. in H. A. J. Munro's edition.

³⁶ Loc. cit. Lib. VI, line 660 in H. A. J. Munro's edition.

³¹ St. Augustine *De gen. ad litt.*, VII, 28.

³² See Maurice de Wulf, *History of Mediaeval Philosophy* translated by P. Coffey, London 1909, p. 93.

³³ M. de Wulf, *Loc. cit.*, p. 287 and Quaracchi, edition t. II, p. 198.

³⁴ Cp. Fracastor's "De sympathia et antipathia

were open to others besides Fracastor. Of these we have already mentioned Remacle Fuchs of Limburg, who uses the word *seminaria* in much the same sense as Fracastor himself. Another contemporary who dwells on the same theme was Paracelsus (1490-1541). Life this writer regarded as a perpetual germinative process, controlled by an indwelling spirit or Archeus. Developing this idea, Paracelsus attained a sufficiently clear conception of the method by which disease is propagated to lead him to speak of the morbid "seeds."

Whatever may be the verdict on this extraordinary man as a pioneer of medical thought, it is certain that he had none of the clearness, brevity and skill in classification of his humanist contemporary Fracastor, nor had he the same power of consecutively developing a subject. We here quote a passage involving the theory of "semina" from his work, "The Doctor's Labyrinth."³⁷ The chapter gives a fair idea of the intricacies and difficulties of his style. We have added a certain amount of explanatory material derived from other parts of the same work.

Of the Book of the Birth of Diseases, to be Recognized from the True Philosophy.

"One thing further it is necessary to explain, namely the origin of diseases according to the content of philosophy. Thus you all know well that the ancients set forth the teaching of the four Humors, how that from them all diseases arise and in them they take their birth; but they forget withal *the veritable origin of disease, that is, from the seeds from which the diseases grow.* None the less, I know full well that man is a Microcosm, wherefore he must have within him the four Elements

³⁷ The "Labyrinthus medicorum errantium" first appeared in 1553 after the death of Paracelsus. We have not been able to see the original edition but have translated the passage from the version in Huser's edition, Strassbourg, 1598.

which they call Humors. [Thus the Elements of the Macrocosm are equated with the Humors of the Microcosm]. Now the Elements (like the Humors) give naught but only receive. And even as a woman cannot become pregnant without a man, so must the feminine Elements receive from their man as from the aforesaid Vulcan [i.e. the Elements must act the part of the female Venus towards the seeds which are the male Vulcan], as this following example sheweth forth. The apple groweth from its seed and the seed is in the apple, and is the Sperm of Vulcan. But in the Elements it findeth a Matrix, it taketh therefrom Nourishment, Substance, Form and its complete Being and it emergeth therefrom according to the nature of its Predestination, as a child emergeth complete from out of its mother.

[i.e. the seed of the apple acts as male to the substance or elements of the apple which are female. It must be remembered that Paracelsus knew nothing of sex in plants or of the fertilization of flowers necessary to produce fruits. He sought, however, like many after him, to bring the generation of plants, which was for him an apparent case of equivocal generation, into line with the better understood types of sexual generation].

"Thus diseases are caused not by the Elements themselves but by the seeds which are sown therein, which accordingly grow in them into their final being and material. . . . He then who would understand Disease will recognize it under the simile of a tree. One will bear apples, another pears, another nuts and so on. Thus also is the difference between diseases, and thus shall diseases be recognized according to the Humors, that is according to the Father and not according to the Mother. The child is truly born of the Mother, but also of the Father. Who

therefore will say or admit that one should seek the disease as a Humor and judge the Humor to be the Disease?"

Another interesting contemporary of Fracastor was Jerome Cardan (1501-1576), who although he did little directly to develop the theory of infection, yet made suggestions that in the hands of others became exceedingly fertile. Cardan's conception of matter as more or less animated was derived either from the Timæus itself or more probably from some Neoplatonic author. It was Cardan who gave a hint to many writers of the succeeding century who combined his conceptions of animated matter with the views of Fracastor on the semina of disease. The early Epicurean thinkers, like modern materialistic writers, had sought to bridge the gulf between atoms and living things by explaining life as due to atomic action. Cardan, the Neoplatonist, like Plato in his Timæus before him and like Leibnitz and many after him, got over the difficulty by attributing living qualities to the atoms themselves.

The discursive style of Cardan has none of Fracastor's accuracy, although, when dealing with purely mathematical or physical questions, he could be incisive enough. In the writings of Cardan, we should seek in vain for the worked-out conclusions that we now associate with scientific authorship. Nevertheless, his volumes of hazy philosophy contain buried in their learned and ingenious pages a mass of original and suggestive thought bearing on scientific subjects that is probably not exceeded in importance by any writer of his century. As an author he

was suggestive and subtle rather than direct and obvious and we may continually meet his phrases quoted, often perhaps unconsciously, by the writers of his own and the succeeding age. His name may for our present purpose be specially associated with the belief that the seeds of disease are truly living. Cardan regarded the inorganic world as animated no less than the organic, while in his suggestions that all animals were originally worms and that all creation is of the nature of a progressive development, a view shared to some extent by his contemporary Paracelsus,³⁸ we may discern the germinal ideas of some modern philosophic and scientific conceptions.³⁹

Suggestions similar to those of Cardan, but bearing even more directly on the subject in hand, were made by Victor de Bonagens (1556), who freely compared the generation and conveyance of fevers to the putrefactive processes which produce "worms" in corpses.⁴⁰ In dealing with the question of fomites de Bonagens shows considerable grasp of Fracastor's theories, and he cites Scabies especially in this connection.

Among the early writers who contributed somewhat to develop Fracastor's theories are Thomas Jordan (1576)⁴¹ and Johannes Marinelli (1577).⁴² Both of these authors not only accepted the theory of seminaria but also described the seeds as multiplying themselves *in their state as seeds* and thus helping to spread the contagion wider. In the conception of these two writers, therefore, the seminaria are more definitely vital than in the work of Fracastor. This point

loc. cit. Vol. 11, pp. 67-87, and elsewhere. For the vermicular origin of all animals see De varietate, Lib. VII 76. De subt., Lib. IX.

⁴⁰ Victor de Bonagentibus or de Bonagens "Decem problemata de peste," Venice, 1556.

⁴¹ Thomas Jordan, Pestis phenomena seu de iis qual circa febrem pestilentem apparent exercitationes, Frankfurt, 1576.

⁴² Joannes Marinelli, De peste ac pestilenti contagii liber, Venice, 1577.

³⁸ The worm-like original of animals is foreshadowed by Aristotle (Historia animalium, Book V, ch. 17) and could doubtless be traced forward through Neoplatonic and Gnostic channels.

³⁹ Cardan's scientific views are contained mainly in his De subtilitate, first (imperfect) edition Nuremberg, 1550, second edition, Paris, 1551, and his De varietate, 1556. For a careful analysis of the difficult subject of his views on the essentially living nature of all matter see the analysis of Rixner and Siber,

was made by none better than by Franciscus Alphanus (1577)⁴³ who wrote that "both infection and contagion come primarily from certain minute particles. These particles, however, are themselves infected by mediating seeds called by some *seminaria*. For seeds have power to generate that which is similar to themselves and these *seminaria* [like seeds] proceed from one case to another generating that disease from which they were derived."

Further progress was made by another obscure Italian writer, Jacob Trunconi,⁴⁴ who in 1578 published at Florence a work on the Pest which showed the influence both of Fracastor and of Cardan. Accepting the *seminaria* hypothesis of Fracastor, he attributes living qualities to the particles as they are given off by the stricken patients, and speaks of them as "breeding" (*pululantes*) and bringing forth after their kind and thus playing the part of agents in the spread of disease. He compares the appearance of these "*semina*" of disease to the breeding of animals in stagnant waters and swamps and thus attributes to them fully vital function. A hazy follower of Cardan along somewhat the same lines as Trunconi was the mystical Paracelsist, Roch le Baillif, Sieur de la Rivière (died 1603),⁴⁵ but more definite contributions were made by the versatile Gabriel Falloppius (1523-1562) whose premature death prevented the further development of his views. In a posthumously published work, Falloppius⁴⁶ connected the living and exhaled corpuscles more especially with phthisis and syphilis. One passage in this book might indeed be interpreted as implying a knowledge of the corpuscles of the blood. This and similar passages were a stumbling-block to certain

of the microscopists of the following century, who interpreted the blood corpuscles, which they really did see, in the light of the hypothetical corpuscles of Falloppius, Fracastor and others. The lines in question in Falloppius' book may be translated as follows:

"Every contagious disease spreads itself throughout the whole infected substance. Thus in phthisis, this force of contagion is conveyed by the vapor which comes from the lungs. This vapor contains certain minute corpuscles of the blood, which issue forth with the breath, and are spread by the circumambient air. So they are attracted to the lungs of another, and if they thus reach a suitable soil, they infect it and communicate the disease."

Fracastor's works were widely read from the very date of their publication, and his brilliant exposition of the essential nature of infectious diseases held the field against the similar hypotheses of Paracelsus, Cardan, de Bonagens and others. For three centuries following his death, however, the views generally held were in the main retrograde as compared to his. The great majority of writers who quoted him (with or without acknowledgment) were mere copyists who added nothing to the conceptions of the master, and it would be impossible to mention here even a tithe of those sixteenth-century writers on the plague and other infectious diseases who owed their theories entirely to Fracastor. Among those of his countrymen who comprehended him more thoroughly may be mentioned the botanist, Pietro Andrea Mattioli (1554),⁴⁷ who applies the theory specially to rabies, Giovanni

⁴³ Franciscus Alphanus, *Opus de peste et febre maligna necnon de variolis et morbillis quatenus nondum pestilentes sunt*, Naples, 1577 (Ch. V).

⁴⁴ Jacobo Trunconi, *De peste et pestilenti morbo libri quatuor* . . . Florence, 1578.

⁴⁵ Roch le Baillif, Sieur de la Rivière, *Du remède à la peste charbon et pleurisie et du moyen cog-*

noistre quel element les excite . . . Paris 1580.

⁴⁶ Gabriele Falloppio, *De morbo gallico tractatus* 1564. Quotation from Ch. XXI. *De modo generatione morbi gallici*. An edition of 1563, which we have not seen, is also known.

⁴⁷ Pietro Andrea Mattioli, *Commentarii ad libros sex pedacii dioscoridio*, Venice, 1554. fol.

Francesco Boccalini (1556),⁴⁸ Hieronymo Donzellini (died 1560),⁴⁹ Giovanni Phillippo Ingrassia (1510-1580),⁵⁰ Andrea Gratiolo di Salo (1576),⁵¹ Thomaso Somenti (1576),⁵² Pietro Sali (1583),⁵³ and Diomedes Amico (1599).⁵⁴

There is throughout the history of the subject a recrudescence of theories of the nature of infection with every large epidemical outbreak. In the last decade of the sixteenth century, eastern Europe was devastated by a widespread outbreak of typhus fever, and a large literature arose on the subject of the "Febris Ungarica." The peculiarly infective properties of this disease gave a great stimulus to the "seminaria" hypothesis which was lucidly expounded in several works on the Hungarian distemper.⁵⁵

Fracastor's doctrines were closely followed also by the learned French physicians J. A. Saracenus (1572),⁵⁶ Le Paulmier de Grentemesnil (Jul. Palmarius 1576),⁵⁷ Francis Val-

leriola (died 1580),⁵⁸ and François de Courcelles (1595),⁵⁹ as well as by the anatomist John Guinter of Andernach (1487-1574)⁶⁰ the teacher of Vesalius, and by the Spaniards Aloysius Toreus (1574)⁶¹ and Nicolao Bocangelino (1600).⁶² Especial mention should be made of Jerome Mercurialis (1530-1603), the distinguished writer on gymnastics, who followed Fracastor very closely. Mercurialis shows much acumen in discussing the specificity of the viruses of different contagious diseases as well as in developing the doctrine of fomites.⁶³

With the seventeenth century the views of Fracastor became so widely accepted that to give a list of the authors who quote him or accept his views would be to provide a fairly complete medical bibliography of the period, and as the overwhelming mass of this literature is mere repetition we may here part with our subject.

⁴⁸ Giovanni Francesco Boccalini, *De causis pestilentialibus urbem Venetani opprimētis*, Venice, 1556, 80.

⁴⁹ Hieronymo Donzellini, *De natura, causis et legitima curatione febris pestilentie*, Venice, 1570.

⁵⁰ Giovanni Phillippo Ingrassia, *Informazione del pestifero e contagioso morbo il quale affligge et have afflitta questa citta di Palermo e molte altre citta a Terre di questo Regno di Sicilia nell' Anno 1575 et 1576. Data allo invittissimo et Potestissimo Filippo Re de Spagna*, 1576.

⁵¹ Andrea Gratiolo, *Discorso de peste . . . con un catalogo di tutti le Peste piu notabili de tempi passati*, Venice, 1576.

⁵² Thomas Somenti, *De morbis qui per finitimos populos adhuc grassantur, et nunc illi ad pestilentes referendi sint, post prima responsa Mantua allatu, brevis disputatio*, Cremona, 1576.

⁵³ Petrus Salius Diversus, *De febre pestilenti tractatus et curationes quorundam particularium morborum . . . atque annotationes in artem medicam . . . Bologna*, 1583.

⁵⁴ Diomedes Amico, *De morbis communibus liber . . . Venice*, 1596, 40. *Tractatus tres*, Venice, 1599, and *De morbis sporadibus opus novum*, Venice, 1605, 40.

⁵⁵ E.g. the Jesuit Balthasar Conradin, *De febris ungaricæ ejusque symptomatum curatione*, Passau, 1594, and Martin Rulandus (filius) *De morbo Ungarico*, Frankfurt, 1600, and other editions.

⁵⁶ J. Antonius Saracenus, *De peste commentarius in quo præter pestis naturalæ, præcautionis etiam atque curationis ipsius uberiorem explicationem, non pauca quæ super eadem materia hoc nostro secula et cælo in contentionem plerumque veniunt obiter strictissime tractantur*, Lyons, 1572.

⁵⁷ Le Paulmier de Grentemesnil, *De morbi contagionis libri septem . . . De lue venerea libri duo*, Paris, 1578.

⁵⁸ Francis Valleriola, *Loci medicinæ communes, tribus libris digesti*, Lyons, 1562.

⁵⁹ François de Courcelles, *Traité de la peste clair et très utile . . . Sedan*, 1595.

⁶⁰ Johan Guinter or Winter of Andernach, *De pestilentia commentarius in quatuor dialogos*, 1565.

⁶¹ Aloysius Toreus, *De febris epidemicæ et novæ, quæ Latine punctularis vulgo tavardillo et pintas dicitur, natura, cognitione et medela . . . Burgos*, 1574. The book is interesting as identifying the tabardillo with typhus fever.

⁶² Nicolao Bocangelino, *De morbis malignis et pestilentibus causis presagiis et medendi methodo . . . Madrid*, 1600. An edition in Spanish was printed in the same year.

⁶³ Hieronymo Mercurialis, *Prælectiones patavii habitu 1577 in quibus de peste tractatur. De peste in universam, præsertim vero de Veneta et Patavina*, Venice, 1577.

THE GREEK CULT OF THE DEAD AND THE CHTHONIAN DEITIES IN ANCIENT MEDICINE

By FIELDING H. GARRISON, M.D.

WASHINGTON, D. C.

"Mortui placantur sacrificiis, ne noceant."

IT is seldom that the aims of classical philology have been more nobly justified than in Rohde's "Psyche,"¹ that remarkable synthetic work in which one of the most interesting of human cults, the belief of the ancient Greeks in the immortality of the soul, has been made to stand out in almost definite outlines from the bare details, sometimes the most shadowy hints, in the classical writers. "Psyche" is to Greek mythology what Frazer's "Golden Bough" is to comparative folklore. Over the carefully inlaid mosaic of footnotes is woven an argument of singular originality and power, revealing in its gifted author some of the emotional aspirations of the poet and the artist.

Erwin Rohde (1845-98), of Hamburg, one of the most learned and talented Hellenists of modern times, was a man who saw antiquity in the spirit of Goethe, Schiller, Herder, Winckelmann and Ottfried Müller, and one who endeared himself to his pupils and his contemporaries by his charming personality and his genial, urbane spirit. His field was the literary and psychological interpretation of the Greek classics, in which he was unsurpassed. His greatest works are his study of the Greek romances (1870), and his *Psyche* (1891-4), in which the Greek

cult of the soul is developed at length from the vague traditional lore of the Homeric poems up to its culmination in Plato. It is shown that the Greek doctrine is analogous in its origins to the genesis of similar ideas in all primitive peoples. The savage's conclusions are drawn from the experience of dreams and other unconscious or ecstatic states, and so it was with the Greeks.

If we contrast Rohde's exegesis with the famous essay of Lessing,² the former seems like an expanded series of symphonic variations upon the theme of the elder writer: "How did the ancients conceive of death?"

On the graphic side, Lessing's work has been continued and completed in Dr. F. Parkes Weber's "Aspects of Death in Art and Epigram" (1914), in which the emblematic concepts of death in poetry, literature and art have been most exhaustively and attractively set forth. The intention of Rohde's work is psychological. The serious and austere character of his argument leaves with one the impression of a clear, cold, beautifully balanced mind, capable of handling the difficult, complex subject with the same large steady grasp of thematic material which his fellow townsman Brahms displayed in the Haydn variations or the F major symphony.

Rohde begins with the concept of death in the Homeric poems. A favorite device of later poets is to see life and death in an inverted order, just the opposite of what we think them, as in the verse of Euripides,

¹ E. Rohde: "Psyche: Seelencult und Unsterblichkeitsglaube der Griechen." 3. Aufl., Tübingen & Leipzig, 1903.

² Lessing: "Wie die Alten den Tod gebildet" (1769).

which Montaigne is said to have inscribed over the rafters of his library:

Who knows but life itself is only dying,
And that which we call death the gate of life.

This thought, which we find again in Wordsworth ("Our birth is but a sleep and a forgetting"), in Hood ("Life is dying, and Death is living"), in Shelley—

Death is the veil which those who live call life;
They sleep, and it is lifted—

is also, as we know, the prevailing concept of the Christian faith. In medieval times, as Parkes Weber says, "a morbid brooding and a pathological love of death," overshadowed everything. After the Revival of Learning, when Fame was conceived of as triumphing over Death, Time over Fame, Eternity over all, as in Petrarca's *Trionfi*,³ there was the robust attitude of Shakespeare's Cæsar—

Cowards die many times before their deaths;
The valiant never taste of death but once.

This jocund acceptance of death as an ineluctable event in nature we find again in Sir Thomas Browne, in Browning's "Prospect," in Whitman's Lincoln poem and frequently in Swinburne. In Heine, in Leopardi, the laureate of death, in Musset's apotheosis of Leopardi, in Matthew Arnold, in Leconte de Lisle, in the lines in Turgenieff's "Fathers and Sons" which are so vibrant with emotion, in all the Russian poets, death is considered, often with charm, from many curious angles. *Weltschmerz*, *maladie du siècle*, *morbidezza*, "the strange disease of modern life," is over all, and what Dr. Keen calls "the cheerfulness of death,"⁴ the sense of death as a natural physiological event, is seldom felt. "One does not find a single man," says Edmond de Goncourt, "who would care to live his life again. Hardly will you find a woman who would wish to live over her first eigh-

teen years: that appraises life." *Cela juge la vie*. But such was not the attitude of the Homeric Greeks. Matthew Arnold has sensed it in one of his narrative poems:

From his limbs
Unwillingly the spirit fled away,
Regretting the warm mansion which it left,
And youth, and bloom, and this delightful world.

So the Greeks evaluated life. "To turn away from life as a whole," says Rohde, "would never have occurred to any Homeric Greek. . . . And indeed, only for the strong, the wise, the mighty, did the Homeric world exist. To them, life, existence upon this earth, was such a certain good that the attainment of all individual joys was conditional upon it. No danger, then, that death, the state which follows life, would ever be confused with life itself." "Argue not with me concerning death," cries Achilles to Odysseus in Hades; "rather would I choose, being on earth, to be thrall to a man of no estate, of no substance, than to rule here over all the departed dead."⁵ Nothing, Rohde concludes, was so hateful to the Homeric Greeks as death and the gates of Hades. "For this very life, this lovely life in the sunshine, surely ends with death, come after it what may."⁶

But the early Greeks by no means regarded death as the end of all. In Erebus, Hades and Persephone did not rule over nothing. In the gloomy house of Hades, the souls of the departed dead were conceived of as *eidola*, mere indefinite images of living beings, comparable with smoke (Iliad, XXII, 100) or shadows (Odyssey, X, 495; XI, 207), not formless, but void of strength and substance, like figures on a film, existing in a state of half consciousness, endowed with feeble chirping voices, and no more vital than the reflections in a mirror. The Homeric Psyche is not identical with the "vital spirit," which dies out with the death of the body. The Psyche is the *alter ego*,

³ Parkes Weber: "Aspects of Death in Art," London, 1914, 115-121.

⁴ W. W. Keen: *Outlook*, N. Y., 1903, LXXV, 446.

⁵ Odyssey, XI, 489-494.

⁶ Rohde, "Psyche," 3. ed., 2.

the *Doppelgänger*, the invisible "astral body" of the living being. Like the Greek concept of life as a breath (*pneuma*), this is one of the commonest conceptions of primitive people everywhere.⁷ In Homer, the departed souls are shut up in the house of Hades, girt by Oceanus and Acheron, never to return. But this restriction was conditioned by the rite of cremation. In the twenty-third Iliad, the ghost of Patroclus upbraids Achilles for neglecting to give his body its "due of fire," and counsels him to proceed with the necessary rites, that his soul "may pass through the gates of Hades." "Far off the spirits banish me, the phantoms of men outworn, nor suffer me to mingle with them beyond the River, but vainly I wander along the wide-gated dwelling of Hades." Achilles then burns the body in the night on a funeral pyre heaped up with flayed sheep and oxen, and the bodies of twelve Trojan youths, put to the sword. Bloody sacrifices to the dead in the night were in the nature of a chthonic rite, one commonly dedicated to the gods of the underworld. Apart from these, such sacrifices were only offered on the graves of deified heroes who had died for their country. Among the primitive Greeks, ritual incineration was apotropaic, designed to lay the ghosts and avert the wrath of the departed, and springing in part from that fear of the return of the dead which characterizes primitive man.⁸ Only by fire were the dead appeased (Iliad, VII, 440), but

⁷ Rohde, *op. cit.*, 2-8.

⁸ Incineration, among the Persians, Teutons, Slavs and Asiatic or Ionian Greeks, was essentially the custom of a nomadic people to whom burial was unthinkable, since it exposed the dead body to the convulsions of nature and the depredations of wild animals, and deprived it of the customary food offerings. The urns containing the ashes of the dead were carried with the wandering tribe, or buried in a hillside, as with the heroes who died on the windy plains of Troy. Through the Neolithic, Cretan and Mycenaean periods, coffinless burial in rockhewn crypts (shaft-burial) or bee-hive tombs was the rule. The piles of stone (scopelism) or rough monuments

once in Hades, return to the upper world was impossible, and they were forgotten by the living (Iliad, XXII, 389). Thus, the cult of the dead in Hades, and that of the *χθόνιοι*, the gods of earth and the underworld, were identical among the early Greeks, although they became widely separated in later time.

Apart from the shadow life in the prison of Hades, the Greeks, as we know, conceived of favored souls as snatched away to the Elysian Fields in the Islands of the Blessed, at the far ends of the flat earth, beyond Oceanus. In the later Eleusinian cult, this hope was held out to all who had been initiated into these nocturnal mysteries, which in all probability represented the abduction of Persephone by Hades, their marriage in the lower regions, and the wanderings of the Earth Goddess, Demeter, in search of her daughter. The gods could also confer personal immortality during lifetime, as with Tithonus, Ganymede, Iphigenia at Tauris or Menelaus, whom Zeus rendered immortal as being his son-in-law through his marriage with Helen, in other words, through no merits of his own, but simply as "Helena's husband."⁹ So, too, Calypso, in the island of Ogygia, desired to render Odysseus immortal as a mark of divine favor, and Aphrodite, as Hesiod relates, made Phaethon a "god-dæmon."¹⁰ Another species of immortality was conferred by the gods through causing favored beings to be swallowed up in the bowels of the earth, wherein they con-

over the graves were originally designed to prevent the deceased from resuming his (astral) body, as also to prevent the destruction of his physical body. Incineration, in the Homeric period, had the same purpose, and, for this reason, the burial of weapons and funeral gifts with the dead disappears with incineration. When burial was revived in the post-Homeric period (8th-7th centuries B.C.), the *κρίπαι* were again buried with the dead. In time, the fear of the return of the dead gradually merged into a desire to attract them, even to the extent of having meals in common with departed spirits.

⁹ Rohde, *op. cit.*, I, 80.

¹⁰ Rohde, I, 135, footnote 1.

tinued to live on eternally as chthonian beings. Thus, in Pindar and the dramatists, there are countless references to the Argive hero and seer, Amphiaras, of the race of Melampus, who, being pursued in battle by Periclymenus, was saved from a spear thrust by a thunderbolt of Zeus and carried with horses, chariot and charioteer into the depths below.¹¹ In Bœotia, the architect Trophonius, being pursued by enemies, was likewise swallowed by the earth and made immortal.¹² Likewise Cæneus, one of the Lapithæ, being belabored with trunks of trees by the Centaurs, stamped upon the ground with his foot and disappeared into the earth.¹³ The same subterranean immortality befell Althaimenes, the founder of the Greek island cities, and his son Amphilocheus.¹⁴ The idea recurs in the legends about Charlemagne, Frederick Barbarossa, King Arthur, Holger Danske, and in the many fanciful beings of German, Mohammedan and Mexican mythology.¹⁵ Amphiaras had an oracle at Cnopia near Thebes; Trophonius in a cave near Lebadea. The sacrifices made to them in the night were those rendered to the chthonian or earth gods. In their chthonian aspect, the gods usually appeared as serpents, or attended by serpents, and so Trophonius appeared in his Lebadean cave. Another attribute of the chthonian or cave-gods was divination through their oracles. In the temple of Apollo Pythoktonos at Delphi, the god, as snake- or dragon-slayer, sat upon a mound (*omphalos*) under which was buried the serpent Python, son of the earth goddess Gaia, and from the slaying of Python, as we read in Euripides (Iphigenia in Tauris,

1245 *et seq.*), Apollo derived his prophetic or iatromantic powers:

Glitt'ring in the burnished shade,
By the laurel's branches made,
Where th' enormous dragon lies,
Brass his scales, and flame his eyes,
Earth-born monster, that around
Rolling guards th' oracular ground:
Him, while yet a sportive child
In his mother's arms that smiled,
Phœbus slew, and seized the shrine
Whence proceeds the voice divine;
On the golden tripod placed,
Throne by falsehood ne'er disgraced,
Where Castalia's pure stream flows,
He the fates to mortal shows.

In the Theogony of Hesiod (453-491), we read that Rhea gave birth to Zeus in a cave in Crete, in order to prevent him from being swallowed by his father Kronos:

Him did vast Earth receive from Rhea
in wide Crete to nourish and to bring up.
Thither came Earth carrying him swiftly
through the black night to Lyctus first,
and took him in her arms and hid him in
a remote cave beneath the secret places
of the holy earth on thick-wooded Mount
Aegeum.

This cave, fabled to lie in the mountain crag of Dicta or on Mount Ida, near Knossos has since been found. At the mouth of the Idæan cave is a colossal rock-hewn altar; in the bottom of the Dictæan cave, a steatite libation table was discovered.¹⁶ In Homer, Minos, the son of Zeus, is represented as holding converse with his father at this Cretan cave every nine years.¹⁷ In his investigations of the Minoan civilization in the palace at Knossos (1903), Sir Arthur

(*alienatio mentis*) in which the soul left the body to identify itself with godhead, thus conferring the power to predict the future, interpret the past, perform cathartic rites, banish demons and check epidemic diseases. Of these seers, Epimenides of Crete, who abode in the cave of Dictæan Zeus for many years, to emerge as prophet, cathartist and healer, was the archetype. Rohde, II, 89-90.

¹¹ Rohde, I, 113.

¹² ¹³ Rohde, I, 115.

¹⁴ Rohde, I, 116.

¹⁵ Rohde, I, 124.

¹⁶ Sir Arthur J. Evans: The Mycenæan Tree and Pillar Cult, London, 1901, I, 15-17.

¹⁷ Crete was the ancient home of the class of seers or visionaries, who, like Abaris, Aristæas, Hermotimus and Empedocles, attained to states of ecstasy



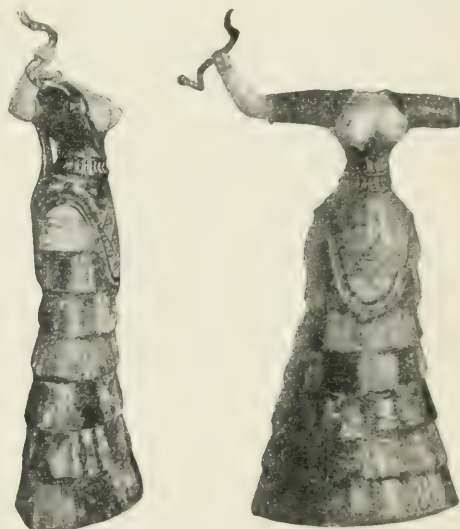
Painted terra-cotta pillars, surmounted by doves, from sanctuary of dove goddess in the palace at Knossos. Each column is a separate religious entity (uranic or celestial aspect). In the Minoan Age, objects of worship were usually aniconic, as a rule trees, large stones or columns of stone. (See, Sir Arthur Evans: *Mycenæan Tree and Pillar Cult*, London, 1901).



Female votary, surmounted by dove, from shrine of the Double Axes in the Palace at Knossos. This terra-cotta figurine shows the transition from the aniconic idol to the icon.



Faience figure of the Snake Goddess (probably the *Magna Mater* of Crete in her chthonic aspect). One of the temple repositories from the Central Palace Sanctuary (Knossos).



Faience figure of female votary from same sanctuary. (From: *Ann. Brit. School, Athens*, 1901-2, viii, 29; 99: 1902-3, ix, 75; 77.)

Evans discovered several clay seal impressions of a warrior god and goddess, attended by lions, which perhaps represent Dictæan Zeus and Rhea in their chthonian aspect. The snake, the special symbol of the *χθόνιοι*, appears in the remarkable faience figures of the goddess and her female votary which were found in the temple repositories of the palace. The figure of the goddess is 34.2 cm. (13½ inches) in height, surmounted by a high tiara of purplish-brown color. About this is coiled a snake, the head of which projects above the tiara while the tail end is plaited about the hips. Two other snakes are interlaced around the hips and diagonally across the shoulders and down the arms. The votary grasps a twisted snake in either outstretched hand. Goddess and votary are attired in garments of highly fashionable cut, a tight fitting jacket bodice, with decorations of volute patterns, a double apron or polonaise, and a bell-shaped skirt, which, in the votary, consists of seven-terraced flounces apparently over a "foundation." In her description of these costumes of 4,000 years ago, Lady Evans observes of the molding of the figures that "the lines adopted are those considered ideal by the modern corset maker rather than those of the sculptor." The bell-shaped skirts, effect of the pronounced hips and steatopygy of the primitive woman, are identical in shape with the garments of the late neolithic period figured on the walls of the prehistoric caves of Cogul and Alpera, and which are still worn by the peasant women of Northern Albania. The hieratic gestures and the grasping of serpents by both goddess and her votary is strongly suggestive of the snake dance of the Hopi (Moqui) Indians for the purpose of rain making, and may imply all that is contained in the generic concept of "making medicine." The snake is, in fact, the chthonic symbol of medicine. Of the mythologic significance of these figures, Sir Arthur Evans observes:

"The snake's head rising above the summit of the tiara in the present figure naturally recalls the uræus as seen above the heads of Egyptian divinities and royal personages. A winged serpent or asp by itself appears as the representative of Nekhebet, identified by the Greeks with Eileithyia, the Goddess of Childbirth, and of her twin sister the 'Nurse' Uatchet or Buto. Its connexion with the Egyptian Mother Goddess Hathor derives a special importance from the fact that, as I have elsewhere shown, the Hathoric staff with twoserpents coiled around its foot supplies the prototype of the rayed pillars with similar snakes on Cypro-Mycenæan signets, in association with a Goddess whose attributes are lions and doves.

"Of the influence, at least of the formal creations, of Egyptian religious art on that of Minoan Crete there can be no doubt. . . . The *ankh* itself was adopted by Minoan symbolism. Neither can there be any hesitation in regarding the Cow and Calf reliefs found in the same Temple Repository with the Snake Goddess and her votaries as taken over from the service of Hathor. . . . But the argument can hardly be carried beyond this point. Taken as a whole neither the Snake Goddess nor her votaries present any special Egyptian characteristics. As a matter of fact they are clad in the last fashions of the Knossian Court.

"The pronounced matronly forms of the Goddess seem to point to her as a Great Mother, and resemble those of the female member of the divine pair whose cult is so well illustrated throughout the Palace, including the Repository in which the figure itself was found. It may be added that the sacral value of the girdle, emphasized here both by the plaited snakes that encompass the loins of the divinity and by the appearance of the girdle as a separate votive object, points to a Goddess of Maternity. The snake form

of Nekhebet, the Egyptian Eileithyia, has also a comparative value in this connexion. Nor must it be forgotten that some of the oldest religious traditions of the spot that survived to Classical times refer not only to the cult of the Mother Goddess Rhea, whose grove and the ruins of whose shrine were pointed out near the later Knossos, but to Eileithyia whose cave sanctuary opened on the side of a rocky height above its ancient haven, the mouth of the Amnisos.

"Of the special cult aspect presented by the Snake Goddess and her votaries no other hint has as yet been supplied by the Palace remains. It is possible that we have here to deal with a specially chthonic aspect of the cult of the same Mother Goddess whose worship is otherwise so well illustrated here. Or, on the other hand, the Snake Goddess may represent an associated divinity, a *σύνθετος*, having a shrine of her own within the larger sanctuary.

"In either case the snakes must by all analogy be taken to show the chthonic character of the worship here represented. It is an obvious feature of primitive cult that, just as the bird descending on the sacred object or person is the outward and visible sign of its possession by a celestial spirit, so the serpent approaching from the crevices of the earth becomes, as at Delphi, the sign of its spiritual possession from the Underworld. The two chief cult images as yet found in the Palace illustrate these alternative sources of inspiration in an interesting way. In the one case a dove is seen settled on the head of the image. In the case of the present figure the snake's head appears in the same position. The parallel, indeed may be carried a step further if we compare the semi-aniconic images of Gournia and Prinias with the triple columns of the terracotta sanctuary found on the East side of the Knossian Palace. In the case of the columns the settled dove again witnesses the divine poss-

session. In the case of the images the snakes are seen coiling up the cylindrical base, which seems to represent the earlier columnar form of the cult object.

"It is hardly necessary to point out that a Mother Goddess has essentially a chthonic side. Demeter, daughter of Rhea, whose early connection with Crete comes out in the Homeric hymn, is herself, in her character of Erinys, a Snake Goddess. The Cretan Eileithyia is a cave divinity. It is, moreover, interesting to notice that the indigenous Nature Goddess of the Island, who retained her Eteocretan names, Dictynna and Britomartis, to Classical times, was also identified with Hekate.

"This indigenous Goddess, of whom Rhea as well as Artemis may often be regarded as the Hellenised equivalent, belongs to the very ancient class of Virgin Mothers. She presides over human births and fosters the young both of land and sea. Like Artemis, she combines the attributes of nurture and of the chase. On Cretan coins we see her in the place of Rhea, guarded by the Corybantes, with the infant Zeus at her bosom. . . . The seal impressions of the figure of a Warrior Goddess attended by lions bring us very near to Rhea; and the companion piece, showing the Warrior God, can hardly be other than an early version of the Cretan 'Zeus'.

"The general associations in which the figure of the Snake Goddess and her votaries were found, are thus seen to illustrate certain broad aspects of the ancient Cretan cult, of which a living tradition survived to historical time. The last examples especially, the lion-guarded Goddess, namely, and her male satellite fit on to the typical cult of the Palace and of Minoan Crete as a whole. It may therefore be preferable to regard the Snake Goddess not as a separate religious entity but rather as a chthonic version of the same matronly divinity otherwise so well represented on

this and other Minoan sites." (Ann. British School Athens, London, 1902-3, IX, 74-87.)

The chthonian gods were first investigated by the celebrated Hellenist Ottfried Müller, who differentiated their cult from that of the Olympian deities. That the chthonian or infernal and the uranic or celestial are only different aspects of identical gods in their capacity for evil or good is the theory of another philologist, H. D. Müller. To discuss the complex details of this matter would lead us too far, but the key to its comprehension lies in the fine observation of Walter Pater that the Greeks, a self-willed, composite people, of diverse racial strains, existing in independent island and city states, combining only in wartime, "had not a religion but *religions*, a theology with no central authority, no link on historic time, liable from the first to an unobserved transformation." Apart from the worship at the great national temples, there existed a vast network of local polytheism, each community having some particular god or gods of its own. In this way, gods of identical function came to be worshipped under different names, many different gods acquired identical or overlapping functions, some gods were polymorphic or, at least, passed through many strange metamorphoses in course of time, and sundry gods were suppressed or displaced in their own localities by other gods. Nearly all the Olympian gods had medical functions, could visit plagues and epidemics upon mankind or avert them at need, and so also the *χθόνιοι*. Among the Cretans, the Mycenæan and the pre-Homeric Greeks, who, like neolithic man, buried their dead, the chthonian gods, identical with Frazer's "Spirits of the Corn and the Wild," were originally gods of the earth and agriculture, promoters of fertility of the soil, growth of crops, fecundity in women, and the general

well-being of man. Among the Homeric Greeks, who burned their dead that the soul of the departed might enter the gates of Hades, these gods became associated with the underworld, acquired infernal functions, thirsted for the blood of human sacrifice, were feared for their power to wreak evil upon mankind, were never addressed directly by name but *pleno titulo*, with flattering appellations, and were placated by apotropaic rites or piacular sacrifices conducted at dead of night. With these deities, as we have seen, were¹⁸ associated (in the older cult) the *ἄραφοι*, perturbed spirits of the dead who had not been cremated, the *ἄωροι*, souls of those who, through fatal accident or suicide, had died before their appointed time, the *βιοάνταροι*, souls of stillborn infants, and the immortalized or deified heroes who, through divine favor, had been either snatched up to Olympus or carried into the bowels of the earth. The caves of cave-gods, such as Dictæan or Idean Zeus or Zeus Trophonius, were regarded as the sites of chthonic oracles, (*Psychomanteia*) and deep clefts in the earth as entrances to Hades (*Psychopompeia*).¹⁹ Thus the *χθόνιοι* presided variously over agriculture, divination and some aspects of medicine. Hesiod, in "Works and Days" (465), counsels the Bœotian farmer to "pray to Zeus of the Earth" before plowing. In the *Iliad* (IX, 457) the same god (Hades, Aidoneus) is styled Zeus Katachthonios. Later, he becomes Pluto or Klymenos.²⁰ Demeter Chthonia and Persephone (Kore), goddess of death and "the poppied sleep," were worshipped at Hermione, Eleusis and through the Peloponnesus. At Delos and Amorgos, Zeus Eubuleus, Demeter, and Kore were jointly worshipped; in Cnidos, Hades, Demeter, Kore, Epimachos, and Hermes Psychopompos, the conductor of souls to Hades (*Odyssey*, XXIV, 19). The earth

¹⁸ Rohde, II, 411-413.

¹⁹ Rohde, I, 213.

²⁰ See K. Lehrs: *Populäre Aufsätze*, 2. Aufl., Leipzig, 1875, 288.

goddess Gaia, Hecate (Gorgo, Mormo, Lamia, Enodia, Empusa), who with her nightly swarm of dogs, Ataphoi, Aoroi and Biothanatoi, brought on terror and disease, Cerberus, the guardian of Hades, the Erinnyes, the Harpies, the Keres (goddesses of doom), Thanatos himself, were all numbered among the *χθόιοι*.²¹ That such beings inspired fear and to the extent of being seldom addressed directly by name is comprehensible. In the poets and dramatists, Persephone, in her chthonic aspect, is always addressed or referred to as "The Maiden" (Kore). So, too, Æschylus entitles his tragedy, not "The Erinnyes" but "The Eumenides."

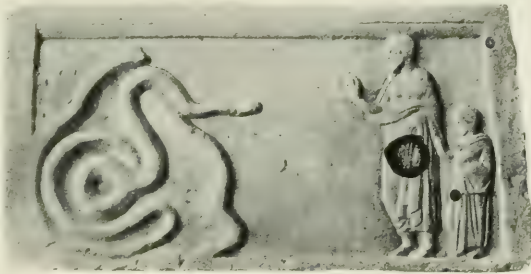
At the beginning of the Choephorae of Æschylus, when Electra invokes jointly Hermes Psychopompos and the shade of her father Agamemnon, Hermes is styled *Χθόνιος*; the name of Agamemnon is not mentioned. The chthonian cult,

as something fearsome and awful, is but dimly shadowed forth in the classical writers. In expiation of the crime of murder, certain deities were invoked who were euphemistically styled Zeus Meilichios or Zeus Apotropaïos, and these deities, as Ottfried Müller showed, were invariably chthonian.²² To the apotropaic gods, an animal was sacrificed (as a kind of scapegoat) in place of the murderer. In the Hippocratic treatise *de insomniis*, those suffering from bad dreams sacrifice to the apotropaic deities, to

Gaia and to the Heroes. In Plutarch, Theseus is purified and freed from the stain (*μίασμα*) of murder by sacrifice to Demeter and Zeus Meilichios. On votive tablets from the Piræus and elsewhere, Zeus Meilichios, like Æsculapius, was represented and worshipped in the form of a serpent. Another chthonian existence which appeared in serpent form was the *ἀγαθὸς δαίμων* the "good dæmon" of the Greek household, often mentioned by Attic writers, an analogue of the *lars familiaris* of the Romans, and in its original form (Rohde surmises), the soul of the *paterfamilias*.²³ In certain Vatican MS. investigated by Rohde, Archigenes describes a species of

non-poisonous snakes as *ἀγαθοδαίμονες*. These were worshipped in Alexandria as "the good house-spirits in serpent guise."²⁴ This brings us to the cult of Æsculapius as a chthonian deity and the significance of the snake in medicine.

To understand Rohde's peculiar interpretation of the Æsculapian myth, let us consider briefly what he says about Erechtheus and Hyacinthus.²⁵ In Homer's catalogue of the ships, it is related of Erechtheus that the earth bore him, but Athena reared him and placed him in her costly temple at Athens, where he was worshipped with annual sacrifices of steers and sheep. In the Odyssey, Athena returning to Athens, enters "the compact house of Erechtheus," which later became



Zeus Meilichios in serpent form (chthonic aspect). Attic votive tablet in bas-relief (4th century B.C.) from the Piræus (Old Museum, Berlin). From Eugen Holländer's "Plastik und Medizin," Stuttgart, F. Enke, 1912, p. 37.

²¹ Rohde, I, 205-212.

²² Rohde, I, 273, footnote 1. The opposite of *Zeus ἀποτρόπαιος*, the averting god, is *Zeus προστρόπαιος*, the avenging god. Erythraean inscriptions also refer

to Athena apotropaia and Apollo apotropaïos.

²³ Rohde, I, 254.

²⁴ Rohde, I, 254, footnote 2.

²⁵ Rohde, I, 135-141.

an Erechtheion, in which the two were worshipped in common. In a crypt of this temple, Erechtheus was supposed to live on eternally in chthonic form as a serpent. A later tradition describes him as "buried" in one place or another. Here we have three characteristic stages in the progress of a tradition: an ancient chthonian god, living in the depths of the earth, is transformed into a mortal hero rendered immortal by an Olympian goddess, sharing her temple; finally, a mortal hero again, he is buried in the same place. So, too, in the temple of Apollo at Amyclæ in Laconia,



Votive relief tablet to Zeus Meilichios from the Piræus (National Museum, Athens). From Holländer's "Plastik und Medizin," p. 118.

the bronze statue of the god surmounted an altar under which Hyacinthus was said to lie buried. The decorations on the altar depicted, not the tender Amyclidean youth beloved of Phoebus, but a mature, bearded man. As in the Python legend, we have here an ancient earth-god suppressed and displaced by the Hyperborean deity, probably, Rohde thinks, "after the Dorian invasion of the Achaian land." The changes rung upon tradition are the same: an aboriginal earth god, a beautiful youth changed into a flower through a god's

favor, a buried mortal suppressed and supplanted by a god. Achilles, a mortal hero in Homer, was worshipped as a god in Epirus, Astypalæa and Erythræa; at Elis, he was revered as a hero with mantic powers, and, at his annual festival, women mourned over his empty "grave" at sunset.



Votive stone to Zeus Meilichios (Berlin Museum), showing the worship of the god in his chthonic aspect. From Holländer, *op. cit.*, p. 117. Æsculapius was also worshipped in chthonic form and as "Heros Iatros." According to the elder Pliny and Ovid, the cult of Æsculapius as a medical divinity was transplanted from Epidaurus to Rome in the form of a huge serpent ("in serpente deus").

In the cult of Æsculapius, the tradition undergoes the same transformations. In his original form, he is an ancient Thesalian earth divinity, a local dæmon, who combined healing powers with the gift of prophecy. In Homer, he is a mortal hero, who learned medicine from Chiron, and whose sons, Machaon and Podalirius, figure as actual military surgeons in the Iliad. Struck by a thunderbolt of jealous Zeus, he is snatched to the skies and rendered immortal.²⁶ In statue, coin or bust, Æsculapius is made to resemble Zeus, in

²⁶ Rohde, I, 141-145. "Æsculapius, ut in deum surgat, fulminatur." Minucius Felix, XXII, 7.

token of his uranic or celestial aspect. Sophocles was actually heroized, acquired a hero-cult, because he once entertained the god Æsculapius in his house.²⁷ In Athens, a Hero-Physician ("Ἡρώς ἰατρός") was worshipped at a special shrine, near the Theseion (Demosthenes).²⁸ Finally, Æsculapius becomes a mortal again, and his "grave" is shown in various places.²⁹ Machaon acquires a grave and a shrine at Gerenia, on the Laconian coast. Podalirius has a grave and "Heroön" near Mount Garganus in Apulia, where incubation (temple sleep) is practised by the sick, and rams are sacrificed. His son, Polemocrates, had a shrine at Eua in Argolis.

Alexanor, brother of Polemocrates, had a Heroön at Titane near Sicyon. Aristomachus, another Heros Iatros, had a healing oracle at Marathon. And so with all the Asclepiads.³⁰ The original chthonic character of Æsculapius is suggested by the fact that the snake was not only sacred to him and associated with him, but, as with the cave-gods and the heroes, *χρόνιοι* both, he himself appeared in serpent form. The cock sacrificed to him by Socrates on leaving the world was a chthonic offering. The snake of the Epidaurian temple is the *ἀγαθὸς δαίμων*, the "good dæmon" of the household cult, a cult which was later transplanted to Rome with the worship of Æsculapius, as we shall see. The staff, entwined with a serpent, was the symbol of Serapis, Hermes and Æsculapius. Doubtless the strange aspect of the serpent, its cold eye and the fascination attributed to it, its darting tongue, its capacity for changing its appearance by rapid coiling and uncoiling, its swift progression and attack, the death-dealing powers of the poisonous species, its supposed value as a remedy in

certain diseases, may have given color to the notion that the creature was possessed of dæmonic powers.³¹ Max Höfler calls attention to the fact that the Greek word *ὄφης* (from which root *οφθαλμός* is also derived) implies "the gazing animal," the creature that is always looking at one.³² The fact that the snake lives in holes in the ground gave it a natural association with the chthonian underworld, and made it the logical guardian and *genius loci* of temples, shrines, oracles and healing springs. Parkes Weber says that "the harmless snakes, which at the present time abound in the hot caverns and natural or artificial galleries where thermal springs arise in the Pyrenees, are probably the same as those connected with the worship of Asclepios (Æsculapius) in Greece and Rome."³³ The size, strength and dangerous character of the Asiatic and African pythons may well have suggested a giant transformed or a metamorphosed god. In the several votive tablets to the apotropaic snake-god Zeus Meilichios, in the museums at Athens and Berlin (Plate II), the huge pythons are represented as awe-inspiring. The elder Pliny, in his Natural History (XXIX, 22), relates that the Æsculapian cult was introduced into Rome from Epidaurus in this chthonic form, and that, in consequence, the rearing of tame snakes in private houses soon became an obnoxious fashion among the Roman dames:

"The Æsculapian snake was first brought to Rome from Epidaurus, but at the present day it is commonly reared in our houses even; so much so, indeed, that if the breed were not kept down by the frequent conflagrations it would be impossible to make head against the rapid increase of them."

²⁷ Rohde, I, 176, footnote 6.

²⁸ Rohde, I, 173, footnote 3.

²⁹ Rohde, I, 142-143.

³⁰ Rohde, I, 185-186.

³¹ See E. Holländer, "Die Schlange," "Plastik und Medizin," Stuttgart, 1912, 87-95.

³² M. Höfler: Die volksmedizinische Organotherapie, Stuttgart, 1908, 142.

³³ F. Parkes Weber: "Aspects of Death in Art and Epigram," 2. ed., London, 1914, 386.

The introduction of the Æsculapian cult, which was occasioned by a devastating epidemic in 293 B.C., gradually displaced the worship of Febris, Mephitica, Angeronia, Fluonia, and the other Roman household gods of medicine. Ovid (*Metamorphoses*, XV, 626-744) indulges poetic license to the extent of conceiving, at great length, how Æsculapius himself proceeded from Epidaurus to Rome in the form of a gigantic serpent—how, upon the advent of a ghastly pestilence, the oracle of Apollo directed the stricken Romans to seek the aid of Apollo's son, how the embassy proceeded to Epidaurus, how Æsculapius appeared to them in a dream, announcing that he would change himself into a serpent, how the god revealed himself to them in the temple next morning in this form—

Cum cristis aureus altis

In serpente deus prænuntia sibila misit—

how he condescended to sail with them to Rome, weighing down the ship with his immense bulk, and how, upon arriving, he resumed his heavenly aspect, ended the pest and became health-bringer to the city—

Et finem specie cæleste resumpta

Luctibus imposuit venitque salutaris urbi.

In commemoration of this event, the Romans gave the eastern corner of an island in the Tiber (now the Isola S. Bartolommeo) the form of the bow of a ship, shaped out by a façade of travertine, the mast being represented by an obelisk, and the prow being decorated with a bust of Æsculapius, with the staff and chthonic snake. In what remains of the ancient travertine, the bust has been sawn off flush with the surface. The staff and serpent remain, and were photographed in 1867, although now covered with sand and slime.³⁴

In the ancient Roman Pantheon, the

equivalents of the chthonian Hades and Persephone were Orcus, also called Dis, Viduus or Consus, and Libitina (Lubentia, Lubia). To Orcus and Mania (the mother of the Lares), Tarquinius Superbus instituted the sacrifice of children during the Compitalia; but after the expulsion of the Tarquins, the consul Lucius Junius Brutus substituted garlic and poppies as offerings to these gods.³⁵

It is a curious fact that the apotropaic medicine of the ancients was directly connected with the omnipresent idea of the efficacy of invisible effluvia, the imperceptible evaporation from substances. Empedocles instances the hounds following the scent, and Lucretius the drying or moistening of garments at the seaside, the gradual wearing away of a ring on the finger, of pavements, ploughshares, statues, seaside cliffs by gradual attrition, the salt taste in the mouth at the seaside, as showing "the existence of effluvia streaming unceasingly from all bodies" (Heidel). Fumes of pitch, asphalt and sulphur were thought to purify. Juniper branches which supplied part of the incense of ancient sacrifices, were burned in the Middle Ages to disinfect houses of the plague. Hemp (*Cannabis indica*), which Herodotus (I, 202, IV, 75) says was burned by the Messagetæ and the Scythians in order to intoxicate themselves with its fumes, formed one of the mediæval substitutes for surgical anesthesia by inhalation. Long before the Middle Ages, Dioscorides (IV, 81) stated that anesthesia could be produced by inhalation of mandragora wine. Professor William A. Heidel, in his study of the "Antecedents of Greek Corpuscular Theories,"³⁶ gives an admirable summary of the matter on the mythological side:

"The primitive Greek saw in nature the play of dæmonic beings: the religion of the people, however much glossed over by the Homeric and post-Homeric tradition, was at bottom one of magic and of occult

³⁴ Holländer: "Plastik und Medizin," Stuttgart, 1912, 90-92.

³⁵ Kissel: Janus, Breslau, 1848, III, 600-603.

³⁶ Heidel: Harvard Stud. Class. Philol., 1911, XXII, 111-172.

powers. Spirits were everywhere, and spirits were believed to be chiefly of chthonic origin. The evidence, which is to be found in the handbooks, need not here be repeated. Every one is acquainted with such facts as that mephitic vapors were the objects of worship;³⁷ that Plutonia, Charonia, or hell-gates, where vapors or hot-springs issued from the earth, were sacred,³⁸ because the exhalations were regarded as spirits,—spirits of the dead. It was to these spirits that women looked for fertility³⁹ and mankind for increase of flocks and herds and for the fruitfulness of the soil. From Hades, we are told, or from the dead, come not only the souls of the living, but also life, nourishment, growth, and the seeds of fruitfulness.⁴⁰ The spirits of the winds are earth-born, and lord it over the surface of the earth.⁴¹ It is to the occult influences which they exercise that tabooed objects owe their sacredness.⁴² The Pythia derived her inspiration partly from the aroma of the laurel, chewed and burned, partly from the vapors issuing from the fissure above which her tripod was placed. Smoke and aromatics were quite generally regarded as producing 'enthusiasm' or possession by the godhead.⁴³ Aromatics, which possess the power of throwing off continuous streams of effluvia without perceptible diminution, had great significance to Greek thought, although it has been generally overlooked. The Fountain of Youth in Ethiopia, described by Herodotus, was, like the incense, the pleasant savor, and the ambrosia on which the gods fed, aromatic and so ethereal as to be almost comparable to a vapor-bath; the foods partaken at the wedding-feast

and at the sacramental meal of the Mysteries are all pungent or aromatic, as are also the herbs laid beneath the dead at funerals.

"But it is a bad rule that does not work both ways. The same exhalations which are welcome to one being will prove to be unwelcome to another. What is one daemon's poison is another's meat. Thus exhalations or effluvia of various kinds are the chief apotropaic and purificatory means employed in the most diverse circumstances. . . .

"Sunlight, as the power of a superior god, is itself purifying; fire again is the purifying and apotropaic agency *par excellence*, as possessing the most evident and most various emanations. Loud noises and the means, chiefly metallic, of producing them, are considered especially effective; but hardly less the effluvia which strike the sense of smell. 'The daemons love not the reek of torches.'⁴⁴ The purificatory use of sulphur is known to Homer.⁴⁵ During the great plague at Athens they burned 'sweet-smelling wood.'⁴⁶ Almost all cathartic simples known to the materia medica of the Greeks possess a strong odor, rank or aromatic; wines are diuretic, diachoretic, or constipating according as they are aromatic or not; flatulent (*πνευματώδης*) food was tabooed by the Pythagoreans and Empedocles.⁴⁷ The efficacy of olive oil as a daily unguent and at burial was no doubt partly due to its aromatic properties; hence also the use of it, or of wine, in the first bath given to the infant, and subsequently in Christian baptism. Nor should we overlook the extensive use of fumigations by Greek physicians; such as

³⁷ Frazer: *Adonis, Attis, Osiris* (Golden Bough, pt. IV), London, 1914, I, 203-206.

³⁸ Rohde, I, 213, footnote 1.

³⁹ Rohde, I, 246-249.

⁴⁰ Hippocrates: *De diæta*, 92 (Littré, VI, p. 658).

⁴¹ Rohde, I, 247.

⁴² Farnell: *Cults of the Greek States*, III, 132.

⁴³ Rohde, II, 60.

⁴⁴ Plato, *Phaon*, apud Athen., 10, 58, 442A.

⁴⁵ *Iliad*, XVI, 228; *Odyssey*, XXII, 481.

⁴⁶ Wellmann: *Fragmente der griechischen Aerzte*, I, 109.

⁴⁷ Rohde, II, 162, footnote 6; 164, footnote 1; 181, footnote 2. Hippocrates: *De diæta*, II, 45 (Littré, VI, 542).

the internal fumigation of women after childbirth, and as an emmenagogue.⁴⁸ Finally, water, a universal means of purification, doubtless owed its power in part to the abundant evaporation, which connected it on the one side with the fructifying spirits which give fertility, and on the other side with apotropaic functions."

Max Höfler has shown, in a very exhaustive way, that the chthonian deities exerted a strange influence upon Greek pharmacology and therapeutics. The very opening lines of the *Iliad* bring us in touch with the legendary aetiology and prophylaxis of pre-Hippocratic medicine—the pestilence visited upon the Grecian host by the wrath of Apollo, and the elaborate transactions and sacrificial ritual required to avert it. From what is known of the chthonian deities, we can better understand the significance of the Hippocratic treatise "On the Sacred Disease," the strongest brief for a rational pathology before the time of Galen. The *locus classicus* (in Francis Adams' translation) is as follows:

"They who first referred this disease to the gods, appear to me to have been just such persons as the conjurors (μάγοι), purificators (καθάρται), mountebanks (ἀγύρται) and charlatans (ἀλαζόνες) now are, who give themselves out for being excessively religious, and as knowing more than other people. Such persons, then, using the divinity as a pretext and screen of their own inability to afford any assistance, have given out that the disease is sacred, adding suitable reasons for this opinion, they have instituted a mode of treatment which is safe for themselves, namely, by applying purifications and incantations, and enforcing abstinence from baths and many

articles of food which are unwholesome to men in disease. Of sea substances, the surmullet, the blacktail, the mullet, and the eel; for these are the fishes most to be guarded against. And of flesh, those of the goat, the stag, the sow, and the dog; for these are the kinds of flesh which are aptest to disorder the bowels. Of fowls, the cock, the turtle, and the bustard, and such others as are reckoned to be particularly strong. And of potherbs, mint, garlic and onions; for what is acrid does not agree with a weak person. And they forbid to have a black robe, because black is expressive of death; and to sleep on a goat's skin, or to wear it, and to put one foot upon another, or one hand upon another; for all these things are held to be hindrances to the cure. All these they enjoin with reference to its divinity.⁴⁹ . . . By such sayings and doings, they profess to be possessed of superior knowledge, and deceive mankind by enjoining lustrations and purifications upon them, while their discourse turns upon the divinity and the godhead. And yet it would appear to me that their discourse savors not of piety, as they suppose, but rather of impiety, and as if there were no gods, and that what they hold to be holy and divine, were impious and unholy. This I will now explain. For, if they profess to know how to bring down the moon, and darken the sun, and induce storms and fine weather, and rains and droughts, and make the sea and land unproductive, and so forth,⁵⁰ whether they arrogate this power as being derived from mysteries or any other knowledge or consideration, they appear to me to practice impiety, and either to fancy that there are no gods, or, if there are, that they have no ability to ward off any of the greatest

⁴⁸ Diels: *Anonymi Londinensis*, 37, 30 et seq.

⁴⁹ In Plato (*Phaedrus*, 244), diseases are said to originate παλαιών ἐκ μνημάτων—which may mean "from ancient wrath" (of unburied dead of past generations: "or from ancient bloodshed." In Sophocles (*Trachiniae*, 1235), insanity is a "possession by

fiends" (the Babylonian *sibtu*); in Euripides (*Hercules Furens*, 907) it is "Tartaric disquietude."

⁵⁰ It is interesting to note that all this comes within the scope of the North-American Indian's concept of "making medicine," the special function of the medicine-man.

evils. How, then, are they not enemies to the gods? For if a man by magical arts and sacrifices will bring down the moon, and darken the sun, and induce storms, or fine weather, I should not believe that there was anything divine, but human, in these things, provided the power of the divine were overpowered by human knowledge and subjected to it. But perhaps it will be said, these things are not so, but, men being in want of the means of life, invent many and various things, and devise many contrivances for all other things, and for this disease, in every phase of the disease, assigning the cause to a god. Nor do they remember the same things once, but frequently. For, if they imitate a goat, or grind their teeth, or if their right side be convulsed, they say that the mother of the gods is the cause. But if they speak in a sharper and more intense tone, they resemble this state to a horse, and say that Poseidon (Neptune) is the cause. Or if any excrement be passed, which is often the case owing to the violence of the disease, the appellation of Enodia (*Hecate*) is adhibited; or, if it be passed in smaller and denser masses, like bird's, it is said to be from Apollo Nomius. But if foam be emitted by the mouth, and the patient kick with his feet, Ares (*Mars*) gets the blame. But terrors which happen during the night, and fevers, and delirium, and jumpings out of bed, and frightful apparitions, and fleeing away,—all these they hold to be the plots of Hecate, and the invasions of the Heroes,⁵¹ and use purifications and incantations, and, as appears to me, make the divinity to be most wicked and most impious. For they purify those laboring under this disease, with the same sorts of blood and the other means that are used in the case of those who are stained with

crimes,⁵² and of malefactors, or who have been enchanted by men, or who have done any wicked act; who ought to do the very reverse, namely, sacrifice and pray, and, bringing gifts to the temples, supplicate the gods. But now they do none of these things, but purify; and some of the purifications they conceal in the earth, and some they throw into the sea, and some they carry to the mountains where no one can touch or tread upon them.⁵³ But these they ought to take to the temples and present to the god, if a god be the cause of the disease. Neither truly do I count it a worthy opinion to hold that the body of man is polluted by god, the most impure by the most holy; for were it defiled, or did it suffer from any other thing, it would be like to be purified and sanctified rather than polluted by god. For it is the divinity which purifies and sanctifies the greatest of offenses and the most wicked, and which proves our protection from them. And we mark out the boundaries of the temples and the groves of the gods, so that no one may pass them unless he be pure, and when we enter them we are sprinkled, with holy water, not as being polluted, but as laying aside any other pollution which we formerly had. And thus it appears to me to hold, with regard to purifications. But this disease seems to me to be nowise more divine than others; but it has its nature such as other diseases have, and a cause whence it originates, and its nature and cause are divine only just as much as all others are, and it is curable no less than the others, unless when, from length of time, it is confirmed, and has become stronger than the remedies applied. Its origin is hereditary, like that of other diseases."

⁵² Rohde, II, 69–80, 405–407.

⁵¹ See, also, the Hippocratic *De insomniis*; for the Greek ritual of purification in case of murder, and its relation to therapeutics, see Rohde, I, 259–300.

⁵³ The sacrificial offerings (*καθάρσια*) of the rite of purification or the water of lustration became *καθάρματα* (rejects) after the ceremony and were thrown away (Rohde, II, 79, footnote 1).

The writer of this Hippocratic treatise makes a clean sweep of all the superstitions which were the basis of Greek therapy in the period between Homer and the Periclean age. The centric feature of this therapy was the idea of *catbarsis*, lustration or purification by priests, seers or magicians from "miasms" cast upon the soul or the body by angered gods, spirits of the unburied dead (*Ataphoi*), spirits of dead heroes, *dæmons*, spirits of the untimely dead (*Aoroi*), and spirits of the unborn dead (*Biothanatoi*). As with primitive savage man, priest, soothsayer (*Mantis*) and mage were originally one and the same. The parturient woman, the new born child and the dead were "unclean," and medicine was either cathartic, designed to cast out these malign influences, apotropaic, designed to avert them, or hilastic, designed to propitiate angered gods and departed souls. If a "hero" slaughtered an enemy or exercised bloody revenge upon the murder of a relative, he was conscious of no moral qualms, of the kind sensed by the Athenians when they ceased to bear arms, but of the need for "purification" from the evil influence (*μίασμα*) arising from his contact with the dead and supposed to emanate from his person; furthermore, he sought protection from the revengeful deities of the underworld. In the second *Iliad*, the Greeks avert the pestilence sent by Apollo through the sacrifice of oxen, of which they partake in a huge barbecue. In the *Odyssey* (XXII, 481-494), after slaughtering the suitors, Odysseus fumigates the house with sulphur (lustration). The things interdicted by the professional cathartists in their dietetic treatment of the "sacred disease"—the fish, goat, sow, dog, cock, as also the potherbs—were sacred to the chthonian gods. The animals sacrificed to them were usually inedible and black (or otherwise uniform) in color. The apotro-

paic shrubs, laurel, myrtle, whitethorn, squills, hellebore, mallow, asphodel, figs, and such ingredients of sacrificial incense as juniper, made up a kind of sacred botany, set apart for ritual purification, and only partaken of by the worshippers during the act of sacrifice.⁶⁴ Hesiod says that asphodel, mallow and squills (plants dedicated to the Chthonioi) were only eaten by very poor and ignorant people.⁶⁵ In the purely religious cult, the sharing of the sacrificial cakes and other altar offerings was regarded as entering into communion with the god or as part of the mystic ceremony of "eating the god," which Frazer found common to so many primitive peoples.⁶⁶ In these apotropaic rituals, the priests and the worshippers acted openly and *ex officio*; but apart from the priesthood, the cathartists and magicians sought in secret to enlist the aid of the Chthonioi and the spirits of the departed by similar rites. Thus arose a kind of ritual therapy, in which certain plants and the parts of certain animals gradually came to be used as actual therapeutic devices. In Dioscorides, Pliny, the magic papyri and the Abraxas, as Höfler shows, *artemisia* is "the blood of Hephaistus," *camomile* the blood of Hestia, cedar resin the blood of Kronos, juniper the blood of Saturn, *Verbena officinalis* the blood of Hermes.⁶⁷ The fumes of incense, ashes and rejects of sacrifice acquired therapeutic values. The fox, wolf, dog, weasel, cow, ram, goat, lion, mouse, and certain birds, fishes and reptiles, being all animals dedicated to the Chthonioi, made up an extensive animal therapy, based largely upon these associations. That this therapy was mainly an associative therapy is obvious from the painstaking researches of Höfler, who shows that each remedy became, in some sort, an open secret, justified by its mythologic associations.

⁶⁴ See Rohde, *passim*, and Höfler, 14, etc.

⁶⁵ Hesiod: *Works and Days*, 41.

⁶⁶ Sir J. G. Frazer: *Spirits of the Corn and the Wild* (Golden Bough, pt. V), London, 1912, II, 48-108.

⁶⁷ Höfler, *op. cit.*, 17-20.

In the ancient Thargelian festivals of the Ionic cities, a town was "purified" by selecting as scapegoats (Pharmakoi) two vagabonds who were flogged with squills and agnus castus and driven into the sea,⁵⁸ just as the catharmata (rejects of lustration or penitential sacrifice) were scattered at crossroads or cast into the water. But even as the drug (φάρμακον) was sacred in a good and a bad sense, through its association with the chthonic idea of atonement or propitiation by means of a substitute or scapegoat (φαρμακός),⁵⁹ so this empirical therapy became more and more detached from the priestly cult of the shrines and Asclepieia. Of the innumerable simples and animal remedies recommended by Dioscorides and Pliny, it is obvious that but few have any pharmacologic rationale in the sense of Schmiedeberg and Cushny. Black hellebore (*Helleborus niger*), with which the seer Melampus purged the daughters of Proitus of their insanity and which Hippocrates used as a rational purge, was originally sprinkled about to "purify" houses and hearths; but white hellebore (*Veratrum album*) which was employed as an emetic, was never associated with the heart. The strangest animal remedies were employed against sterility and to promote fecundity in women, the *point d'appui* of Greek gynecology. Furthermore, the chthonic animal remedies were used in the most varied and capricious way in the treatment of visceral disease, a subject of which the ancients knew little or nothing.

⁵⁸ Rohde, II, 78, footnote 2.

⁵⁹ Höfler, 26.

⁶⁰ Höfler, 279-291.

⁶¹ See Frazer's chapter, "The homœopathic magic of a flesh diet" in "Spirits of the Corn and the Wild," London, 1912, II, 138-168.

⁶² P. Stengel: Chthonischer und Totenkult. Festschr. z. 50 jähr. Doktorjubil. L. Friedländer, Leipzig, 1895, 414-432.

⁶³ The Greek equivalents were the Genesia, birthday festivals of the dead, and the feast of all souls, which formed part of the Dionysian Anthesteria, early in the spring. These were regarded as "impure

The Greeks had no more to do with the modern theory of animal extracts than had the repulsive prescriptions of the *Dreckapotheken* or the early London Pharmacopœias. From a careful analysis and tabulation of 1254 therapeutic prescriptions of the ancients (including those of the Northern races), Höfler shows that the different parts of the animal body were never employed exclusively to heal diseases of the same parts in the human body, but haphazard, according to the tenets of the chthonian cult.⁶⁰ In other words, Greek organotherapy was homœopathic magic in Frazer's sense,⁶¹ but hardly isotherapy, in the sense of "like cures like."

In accepting Höfler's conclusions, we should not lose our respect for Greek therapy, bearing in mind that Galen was one of the greatest rational therapeutists who ever lived, and that Dioscorides contains almost every sample known, up to the days of analytic and synthetic chemistry. Further, Höfler's sweeping inclusion of the spirits of the dead among the Chthonioi must be modified and corrected. In the Friedländer Festschrift, Paul Stengel⁶² shows that the Greek cult of the dead, while originally apotropaic, became in time purely pietistic, a quiet, intimate family cult, like that of our All Souls' Day.⁶³ The chthonian gods were appeased by piacular sacrifices, that is by propitiatory or penitential offerings. The sacrificial offerings to the dead were nutritive libations without which they would

days," when all the dead returned (the Roman *mundus patet*), when the temples of the gods were closed and all business suspended. Hawthorn leaves were chewed at dawn and the doorposts were smeared with pitch, the fumes of which were apotropaic; private familial offerings were made and libations of wine poured out; on the last day of the feast, which was dedicated to Hermes Psychopompos, pots containing cooked fruits and seeds of the earth were set apart "for the dead." Like the "Ilicet" which dismissed a Roman funeral, the feast terminated with the words: "Away, ye Keres! the Anthesteria are over" (θόραξε Κήρες, οὐκ ἔρ' Ἀνθεστῆρια), Rohde, I, 234-239.

starve, always poured over the grave itself with averted countenance, and any good which accrued to the offerer was of secondary importance. The Chthonioi required human sacrifice, or the substitution of certain non-edible animals as scapegoats, or else sacrificial cakes made of the burnt products of the soil, or *nephalia* (mixtures of water, milk and honey), but no wine. Sacrifices to the dead were seldom human, but usually required female or castrated animals, and always included wine. Sacrifices to the Chthonioi and the Heroes were made at dead of night on low lying altars. And the cult remained immemorially the same. Sacrifices to the dead were made originally at night, later in broad day, always upon a grave, and their apotropaic intention finally resolved itself into intimate familial piety. In the ancient cult, the dead were shrouded in royal purple, the color of the Chthonioi.

In the graphic and plastic arts, as Lessing, and after him Parkes Weber have shown, the ancient figurations of death were usually serene and beautiful. In the Iliad, Hypnos and Thanatos, Sleep and Death, are twin brothers; the one figured on antique gems as a youth with wings attached to his temples, the other, as he appears in the Alcestis of Euripides, a winged figure clad in black with drawn sword.⁶⁴ Hermes Psychopompos, the conductor of souls, is the Cyllenian Mercury of the Odyssey, with the golden wand, the winged golden sandals and kerykeion (caduceus). The soul (Psyche) is figured as a butterfly, sometimes resting on the shoulder of Hermes,⁶⁵ suggesting the *animula, vagula, blandula*, of Hadrian, or the charming image of Flaubert, *comme une psyche curieuse, comme une âme vagabonde*. On the Roman memorial tablets and gems, Death is a

cupid with an inverted extinguished torch (Lessing). The skeleton frequently appears, on antique gems and wine-cups, but merely as a *memento mori*, never as an image of death.⁶⁶ Some of these skeletons are even tipsy (Parkes Weber). The mediæval figurations of death as a skeleton may, as Parkes Weber suggests, have come from the late Roman idea of representing *larvæ* as skeletons or skin-and-bone figures;⁶⁷ but it is also highly probable that the skeletons in the Dance of Death of the younger Holbein may have been derived from the innumerable manuscript illustrations of anatomy which began to be common in the period. Many of these represented shriveled or hastily dissected skeletal preparations, what Sudhoff terms the *Lemurengestalt*. In the *passacaglia* which forms the last movement of Brahms' E minor symphony, a movement which Max Kalbeck interprets as expressing the sovereignty of Death (*Thanatos Basileus*), the Holbein idea, Hermes Psychopompos with the divinity of the inverted torch, form the leading motive of the lovely interlude in E major.⁶⁸

But what Frazer calls "the perils of the soul" were sensed by the ancient Greeks in a way far removed from the sublime *ne me perdas* of Mozart's Requiem or even the sentiment of Plato. In Swinburne's "Ilicet," which dramatizes the sensations of a pagan funeral, we get the feeling of primitive man about the necessity of bloody human sacrifice to the dead:

Yea, for their sake and in death's favor
Things of sweet shape and of sweet savor
We yield them spice and flower and wine;
Yea, costlier things than wine or spices,
Whereof none knoweth how great the price is,
And fruit that comes not of the vine.

⁶⁴ For a picture of a bas-relief representing Alcestis between Hermes and Thanatos (*British Museum*), see Parkes Weber, *op. cit.*, 382.

⁶⁵ Parkes Weber, 362, 388-390.

⁶⁶ Parkes Weber, 18 (Boscureale wine cup), 338-357.

⁶⁷ Parkes Weber, 48.

⁶⁸ Max Kalbeck: Johannes Brahms, Berlin, 1912, III, 476-83.

From boy's pierced throat and girl's pierced bosom
 Drips, reddening round the blood-red blossom,
 The slow delicious bright soft blood,
 Bathing the spices and the pyre,
 Bathing the flowers and fallen fire,
 Bathing the blossom by the bud.

Repulsive, sadistic even, as these lines may seem to our modern taste, they yet stand for something figured on scores of antique gems,⁶⁹ something which undoubtedly thrilled the primitive Greek with awe. Concerning this, Havelock Ellis says: "There can be no ideal conception of Life and no true conception of Nature if we seek to shut out Death and Pain. It is the feeble shrinking from Death and the flabby horror of Pain that mark the final stage of decay in any civilization. Our ancestors, too, offered up human sacrifice on their altars, and none can say how much of their virility and how much of the

⁶⁹ See A. Furtwängler, *Die antiken Gemmen*, Leipzig, 1900, or the figurations of human sacrifice from the same in Höfler, *op. cit.*, 10-11.

promise of the future they held in their grasp were bound up with the fact."⁷⁰ Rohde tells of even darker rites.⁷¹ In the *Choephorae* of Æschylus (439) and the *Electra* of Sophocles (445), Clytemnestra is hinted to have cut off the hands and feet of the murdered Agamemnon and suspended them around his neck (*μασχαλισμός*), lest dead hands return (as in Maupassant's grisly "La Main") to wreak vengeance. "By way of lustration" (*καπί λουτροῖσιν*), she wiped the bloody weapon upon his head. In another apotropaic or cathartic rite, mentioned in Æschylus (*Fr.* 354), the wounds of the murdered body were sucked thrice by the slayer and ejected from the mouth in three successive spurts. But these are traits of the raw primitive which we can stomach for a moment but upon which it is not good to dwell.

⁷⁰ Havelock Ellis: *Impressions and Comments*, Boston, 1914, 247.

⁷¹ Rohde, I, 322-326.

THE THREE CHARACTERS OF A PHYSICIAN

Enricus Cordus. 1486-1535.

Tres medicus habet facies, unam, quando rogatur
 Angelicam; mox est, cum juvat, ipse Deus.
 Post ubi curato, poscit sua præmia, morbo.
 Horridus apparet, terribilisque sathan.

*Three faces wears the doctor: when first sought
 An angel's!—and a god's, the cure half wrought:
 But when, that cure complete, he seeks his fee,
 The Devil then looks less terrible than he.*

VOLTAIRE'S RELATION TO MEDICINE *

By PEARCE BAILEY, M.D.

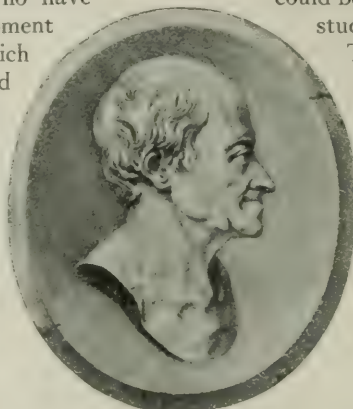
NEW YORK

IN idealizing the great men whose discoveries have transformed what, a short time ago, was little more than a speculative system of philosophy, into a science whose bounds are fixed only by the limiting qualities of humanity, it should be remembered that the followers of Hippocrates are not the only ones who merit gratitude for what they accomplished for medicine. Medical growth implies more than the work of gifted doctors alone. All who have striven for human development have furthered this art which joins or crosses every thread of social fabric and which has always been more than a system of healing.

Medicine must be the last barrier but one between man and the fates. It stands at the entrance and exit of life and, since it seems nearest the mystery, it has always been patiently looked to to disclose what lies behind that strange curtain which rises and drops so abruptly. It is so bound up in our souls with the arts and humanities, that its history is inseparable from the history of all human thought and behavior. Its records, at first sight seeming to mark a development and ascendancy quite its own, are really the records of the desires and fears and beliefs universal to humanity; and neither they nor the men who helped make them can be understood by themselves.

As long as thought was not free, medicine, in common with other branches of learning, had to struggle with tradition, dogma, prej-

udice, superstition, all backed by the might of church and state. Society, inevitably averse to reality, placed, as long as it could, these deadly taboos across the path of whatever might bring it and reality face to face. It was only as, little by little, opinions ceased to be matters reviewed by the police, and when investigation was no longer regarded as offensive to God, that the problems of medicine, so long waiting solution, could be brought into the light to be studied.



FRANÇOIS MARIE AROUET DE VOLTAIRE
(1694-1778).

The broader vision which made this development possible came from the men outside of our profession quite as much as from those within it; and it was these allies of ours especially who risked their lives in the struggle for the establishment of tolerance. They fought our battles, and their names must be placed with the names of actual medical craftsmen who, in wresting secrets from Nature, made com-

mentary give place to observation and controlled fancy by experiment. Euripides and Petrarch and Bacon and Luther, each in his own way and according to his lights, helped to break down the barriers which kept men's eyes from the truth; each helped to mold public opinion to a point where scientific medicine became possible. Some did the work which resulted ultimately in advantage to our art without having touched on medical subjects at all; others, like Athanasius Kircher (1602-1680), the Jesuit priest, the earliest microscopist; like Antony van Leeuwenhoek

* Read at a meeting of the Harvard Medical History Club, Boston, Mass., November 1, 1916.

(1632-1723), the wealthy brewer's son of Delft, who gave the first accurate figurations of bacteria, who demonstrated the capillary anastomosis between arteries and veins, who presented twenty-six microscopes to the Royal Society and contributed many papers to it; like Descartes (1596-1650), who, in establishing the physical theory of vision, laid the foundation of ophthalmology; men such as these threw light on our problems through solving problems of their own.

Among the men who figured in shaping medical history in more ways than one, must be counted Voltaire. It would be superfluous to add one word here as to what Voltaire's wit and fancy and satire accomplished to establish truth in the world as a principle. But it seems not unreasonable to suggest that in fighting for general tolerance, he did more to advance our profession than some of its own members who, however distinguished, compromised with the old dogmas. It may be remembered that Sir Thomas Browne (1605-82), in writing

to correct "Vulgar Errors," was proved hopelessly enmeshed in them himself. But Voltaire, in addition to being a social reformer, did much to spread actual medical learning. As an encyclopedist he was obliged to treat of medical subjects, and he gave himself a wide range; throughout all he wrote on these topics appears an uncanny sagacity which led him to champion those explanations of human behavior which, as it turns out, have best stood the test of time. Perhaps it cannot be said of him that he was

an original thinker. His genius was of a different order from Franklin's, whose most casual glance at a subject resulted in some entirely new benefit to it. But he assembled from all parts of the earth stray bits of information, fused them together and presented them as a whole, in his own way. Thanks to his special talent he was able to give to the world views on medical topics saner than those held by most of the physicians of the times.



MARMONTEL, whose *Moral Tales* delighted the salons of Paris.

He is represented as the ruthless iconoclast, bitter and sarcastic and unforgiving. But he has a way of tempering his invectives with a naïve or witty word which reveals a fundamental belief in the good intentions of humanity; and many incidents in his life, of which I recall two, indicate quite plainly to me that as a man he was of an essentially kindly nature. Appreciating Marmontel's verses, he urged this young man, a total stranger to him, to come to Paris from the Limousin, with the assurance that the Controller General of Finance, M.

Orri, would take care of him. But when the future author of the *Moral Tales* arrived in Paris, Orri was no longer in favor and could do nothing for him. While he was staggering under this blow, Voltaire said to him, "I have not invited you here to abandon you. I will suffer you to have no other creditor than Voltaire." And in another and more intimate relationship, Voltaire's gentleness of character for those he really loved seems to have been unmistakable. This was when he discovered that Madame du Chatelet

had been untrue to him. After hours of unhappiness and despair, when she came to him and asked his forgiveness, he said to her, "Madame, everything you do is right," and really forgave her.

He seems to have been born with a mania for liberty which his early troubles only deepened. Thrown into the Bastille more than once, banished from France for years, he never really, except for tactical purposes, changed his views on oppression and organized dishonesty.

During the XVIII century, Great Britain was the only European country which had curtailed the arbitrary powers of Royalty. In France Louis XV was able to forbid the publication of the famous encyclopedia, and many writers were persecuted without reason and with scant mercy. It seemed that there was an unmistakable advantage to learning in England as compared with its position in France, and Voltaire was incited to work for a similar intellectual enfranchisement for his countrymen.

It was during his visit to England as a young man, that he came to realize how much France was remaining behind in the development of true wisdom. While there, he attended the stately funeral of Newton, and, as Parton informs us,

"In extreme old age his eye would kindle and his countenance light up when he spoke of having lived in a land where a professor of mathematics, solely because he was great in his vocation, could be buried in a temple where the

ashes of kings reposed and the highest subjects in the kingdom felt it an honor to assist in bearing thither his body."

His British experiences seem to have vitalized the main springs of his mind and to have given direction to his energy. But he was too accurate an observer of human nature to confuse political with intellectual freedom. He knew, as well as Le Bon, how the crowd is made up; he saw that democracy was a dream and realized that the few govern. But he saw also, and just as unerringly, that the advancement of humanity depended on learning.

There was no lack of proof in his time of the terrible penalties men were forced to pay for expressing the most abstract ideas. It may be remembered that in the century in which Voltaire was born the French Parliament issued a decree which forbade all persons, under pain of death, to hold or to teach any method contrary to the ancient and approved authors. This decree came about from the



LADY MARY WORTLEY MONTAGU, through whose determination inoculation was introduced into England.

visit of two chemists to Paris who audaciously recognized five elements different from the four elements of Aristotle, and who further failed to agree with the categories and substantial forms of the master. They were tried, their books were solemnly burned and they were banished. But Parliament passed the Act referred to in order to show that it did not propose to deal so leniently with similar offenders in the future. Regarding this incident Voltaire says, "Respect for tradi-

tion has hindered intellectual progress for centuries and was extended in the case of Aristotle to the most servile credulity." The same Parliament of Paris which avenged the insult by the chemists to Aristotle, forbade the use of quinine and emetics. Against prejudices such as these Voltaire made war to the end of his days.

In our boyhood, we heard chiefly of Voltaire as the ruthless atheist who wanted to destroy religion. As a matter of fact, he attacked everything, whether military or ecclesiastical or political or social, in which he saw domination and oppression, with pretence and quackery tagging inevitably behind them. "Fanaticism," he writes, "is a mental disease as contagious as smallpox. Once it has eaten into the brain, it is almost incurable." And elsewhere he says, "The world is full of quacks, in medicine, in theology, in politics, in philosophy," and he asked to be saved from such men as Mesmer. The ideas which he stood for and scattered (and he was the most read author of his day), and which were thought as outrageous for so long, are now largely current. They had, perforce, to become so before medicine could come to its own.

The century in which he passed his adult years was poorer in great medical men than the preceding one. Harvey and Malpighi and Redi and Sylvius and Willis and Sydenham had done their work and joined the immortals. In Voltaire's own century, the work of Pinel and Jenner was accomplished after his own was finished; of Voltaire's contemporaries, Von Haller, of whom it was said that the only things that he lacked were the faults common to great men, stands out now as the chief towering figure; Boerhaave was the teacher acclaimed everywhere, and John Hunter was revolutionizing surgery in England. But it was chiefly a century of progress in the collateral sciences of botany and chemistry, as is shown by such names that stand out in it as those of Linnæus, Priestley and Lavoisier.

There was no clinical instruction until 1745, and quackery and imposture of all kinds flourished like weeds in a garden badly kept. The insane were regarded as menagerie animals to be viewed in some places on the payment of a fee. Until the middle of the century in Germany, surgeons were called "Feldscheerer," because their duties included shaving the officers; and in France surgeons were separated from barbers and wig-makers only in 1743, following by twenty years the establishment of the Academy of Surgery, which was accomplished by Voltaire's friend, François de L. La Péronie (1678-1747) of Montpellier. The great physicians were well-to-do and often cultivated men, but far less inspiring than in the preceding century. Medicine itself was in a rather chaotic condition, as few members of the profession had profited in an all around way by its most advanced teaching.

But in spite of the fact that medicine was sterile in his time, throughout all that Voltaire wrote about physicians and medicine it is easy to recognize the witty author as their loyal admirer and defender. Physicians whom he thinks unworthy he attacks, sometimes with scant justice; but everywhere through his writings shines his unflinching belief in this oldest of arts, and his admiration for its prophets.

He had much to say about doctors, past and contemporaneous. Against Gerhard Van Swieten (1700-1772), first physician to Maria Theresa, who opposed the introduction into Vienna of certain books on philosophy (one of them Voltaire's) and who also, like his teacher Boerhaave, opposed inoculation against smallpox, Voltaire directed the following satirical verses:

Un certain charlatan, qui s'est mis en crédit
Pretend qu'à son exemple, on n'ait jamais d'esprit.
Tu n'y parviendras pas, apostât d'Hippocrate,
Tu guérirais plutôt les vapeurs de ma rate.
Va cesser de vexer les vivants et les morts
Tyran de ma pensée, assassin de mon corps.
Tu peux bien empêcher les malades de vivre.

Tu peux les tuer tous, mais mon pas un bon livre.
 Tu les brules, Jérôme; et de tes condamnés
 La flamme, en m'éclairant, noircit ton vilain nez.

Of Simon-André Tissot (1728-97) the famous practitioner of Lausanne who became widely known through his popular writings on onanism, on the hygiene of literary men, and on the diseases of men of the world, Voltaire writes to a woman friend,—“He has never cured anybody and is more ill than everybody while he writes his little medical books.”

But much of the evil he says against doctors was justified or put out in the spirit of pure fun. “I know nothing more laughable,” he writes a friend, “than a doctor who does not die of old age.” And again, “Illness more cruel than Kings persecutes me. It only needs doctors to finish me off.” As a matter of fact, he believed in them.

“The first to bleed or purge happily a patient with apoplexy; the first to conceive the idea to put a bistoury into the bladder for the purpose of extracting a stone and then to close the wound up again, the first who knew how to keep gangrene from some part of the body—these men were almost divine and not at all like the physicians described by Molière. You may see fevers and ills of all kinds being cured without it being proved whether nature or the doctor worked the cure. You see diseases whose outcome cannot be foretold; twenty doctors are mistaken until the one who has the finest intelligence, the clearest vision, discovers the nature of the disease. It is, therefore, an art and the superman knows the fine points of it. Thus La Péronie made the diagnosis that a certain courtier must have swallowed a sharp bone which resulted in an ulcer and endangered his life; Boerhaave found the cause of the cruel and hidden disease of the Count Vassenaar. There is, therefore, a true art of medicine; but in every art, then, are Virgils and Malvius.” And elsewhere he says, “Les maladies sont plus anciennes que la médecine

et tous les besoins ont existé avant le secours.”

“Molière made no mistake in ridiculing physicians,” he said, “for, for a long time, out of every hundred doctors, ninety were quacks. But it is just as true that a good doctor can often save life and limb. Men who pass their lives restoring health to others would be superior to all the great ones of the earth and would resemble divinity. To conserve and repair is almost as fine as to make. For five hundred years the Romans had no doctors; being occupied solely with killing they made no attempt to save life. What, then, did they do at Rome when they had putrid fever or bubonocoele or pneumonia? They died.” In writing concerning Van Dale, the Dutch physician, he said: “The Devil should not try his tricks on a clever physician. Those familiar with nature are dangerous for the wonder-workers. I advise the Devil always to apply to the faculty of theology—not to the medical faculty.”

He had the keenest appreciation of the Greeks, and of Harvey, and of Boerhaave, and of men of their kind, and he speaks with affection of the various men who attended him in his illnesses. He resents Rousseau's ungrateful treatment of Cabanis, a surgeon of great reputation, who passed sounds on the author of the “Social Contract,” “It seems that ingratitude holds a high place in the philosophy of Jean Jacques,” Voltaire exclaims. Voltaire knew Haller and appreciated his rare talents, though he thought him stiff and unbending, and said of him that his “Protestant zeal makes intolerance a fashion in the Canton of Berne.” There was ill-feeling on both sides. Casanova, the Venetian charlatan and gossip and “*bomme à bonnes fortunes*,” relates that after a visit to the Swiss savant he visited Voltaire, to whom, in his mischief-making way, he brought up the name of Von Haller. “There,” exclaimed Voltaire, “is a great man—one we must all bow to.”

"I am sorry," Casanova replied, "to inform you that Von Haller entertains no such opinion of you." "Well," Voltaire answered, "the fact is that in all probability we both are mistaken."

To Doctor Doran, who invented bougies, he sent his compliments though he did not need him. He summons L'Écluse, surgeon dentist of the King of Poland (formerly a concert hall singer), to repair the "irreparable teeth" of his niece. He recounts with great satisfaction that it was Lilio, a Roman physician, and not Gregory XIII, who reformed the calendar. "It wasn't so with the Greeks," Voltaire adds; "with them the glory of the invention remains with the artist."

In sending his portrait in 1775 to Dr. J. B. Silva (1682-1742), first doctor to the Queen, who had attended him, he included these verses:

At the shrine of Epidaurus it was etiquette
to bring

An image of the person
whom the gods had
cured or saved;

So to Silva, who in mastering death has like
a god behaved,

We should offer the same thing.

O Modern Esculapius, I owe my days to you

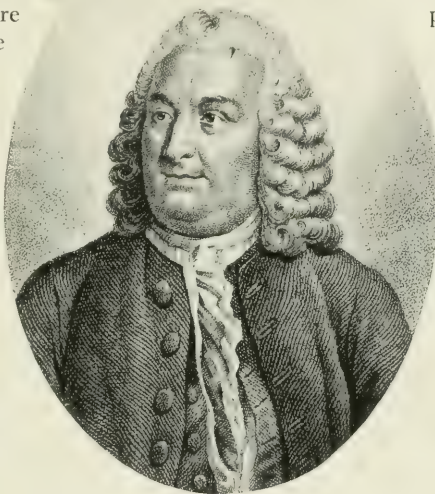
And you look upon your handiwork in seeing me
anew.

He tells us that Theophraste Renaudot (1586-1653) the founder of the *Gazette de France*,¹ published thirty-four years (1631) before the first Oxford Gazette, was a doctor.

¹ These early gazettes, like the Roman *Acta Diurna*, contained official announcements of current events. Renaudot's information came directly from Richelieu.

He forgives J. B. Morin (1583-1656), who cast the horoscope of Louis XIV. "He was a savant in spite of the prejudices of the times," he exclaims. Of G. Patin (1602-1672) he says that he was more famous for his letters than for his medicine. "This man seems to prove that those who hastily write up current events are misleading historians." It is the letters of Patin, who was Dean of the Paris Faculty, which Garrison cited as showing the "sterile inefficiency of the internists of the seventeenth century."

Through Voltaire's works allusions to medicine and physicians abound. In writing of physicians, he says, "The small number of great physicians who came to Rome were slaves. Thus, to the Grand Seigneurs of Rome, a doctor became a luxury like a *chef*. Every rich man had in his suite, perfumers, bathers, musicians and doctors. The celebrated Musa, physician to Augustus, was a slave. He was given his freedom and made a Roman Knight, and from



VON HALLER, the great man without humor.

then on, medical men became persons of importance. When Christianity became established, various councils forbade monks to practice medicine, which was just the opposite which should have been done if good to the human race was to be gained. How fortunate it would have been if monks had been made to study medicine and to cure the ills of humanity for the love of God. Having nothing but Heaven to gain, there would have been no quacks. They might have poisoned infidels, but this would have

been good for the church. Perhaps then Luther would never have robbed our holy father, the Pope, of the half of Christian Europe; for at the first fever of the Augustin Luther, a Dominican could have given him pills. You may say he would have refused to take them; but perhaps they could have found a way of making him."

He abhorred the ceremonials that were and still seem, in a way, inseparable from the practice of medicine, as he abhorred shams of all kinds. "I have always had a secret aversion for that Swiss doctor of yours," he wrote a friend. "I despise a man who dares not tell you what remedy it is that he is giving you. The absurd quackery of diagnosing diseases by temperaments and by urine is the shame of medicine and of reason." And elsewhere he says, "How foolish it is that we know what the cook gives us for supper, and don't know what a doctor gives us when we are ill."

When in 1778 he died at the age of eighty-four, his organs were all normal, only "dry," as the autopsy report has it. But he was frequently ill, as may be expected of a body lodging a mind to which repose is unknown, and he wrote much about illness.

"I regard long illnesses as a kind of death which separates us from the rest of the world and makes it forget us. I am trying to get used to this first kind of death so that the second shall not frighten me so much."

"It is the lot of old age to be ill and these little warnings are the clock striking which announce that very soon there will be no more time for us. Animals have the advantage of humans; no clock sounds their hour and they die without guessing it; they have no theologians to tell them the four ends of life or to pester their last moments with impertinent ceremonies; it costs them nothing to be buried and no one contests their wills. But we have the best of them after all, for they know only habit while we have friendship."

Throughout all his writings one may find perspicacity and common sense in his recommendations as to the conduct of life and the care of body and mind. When well himself, he praised hygiene above remedies and was an advocate of the *Natura Victrix* formula. Under the heading of "Medicine" in the philosophical dictionary, the doctor says to the Princess:

"Let Nature be your doctor in chief. It is she who does everything. Of all those who have extended their life to one hundred years, not one belongs to the faculty. The King of France (Louis XV) has already buried forty of his physicians."

The Princess replies:

"In truth I hope to bury you too."

Voltaire relates many anecdotes which throw light on some of the quasi-medical customs of the times. One of them shows the distinction between social position and justice. Constantin, a midwife, performed a criminal operation on a lady of the court so unskillfully that the patient was fatally injured. She was in great suffering, and her lover, when he saw her, wishing to relieve her sufferings, became possessed of what might now seem an access of kindly zeal, and killed her by breaking open her head. He fled and was banished, but later, after arranging an advantageous marriage for the King's brother, was again welcomed at court. But for the unfortunate midwife there was no such mercy. She was hanged and thrown into quicklime. "There would have been no use in coming to visit her," says the sprightly Patin, "there was nothing left to recognize her by."

Regarding witchcraft he relates that the *Marechale d'Ancre*, an Italian friend of Marie de Medicis, whose husband, Concini, had been murdered with at least the connivance of Louis XIII, called a Hebrew doctor called Montalto from Italy to see her, having first complied with the recognized formula in such matters by obtaining permission from the Pope. At that time, it

may be remembered, Paris physicians did not have as good reputations as the Italians, it being these latter who were reputed as masters of all the arts. It was claimed against the Marechale that this Montalto was a magician and that he had sacrificed a white cock at the Marechale's. At any rate, he could not cure the lady of her vapors, which were so compelling that instead of believing herself a witch, she conceived the counter idea that she was bewitched herself. She then had the weakness to summon two exorcist priests from Milan, who said masses for the vaporous lady and assured her she was cured. But when, in addition to the charges against her of magic, she had questions put to her regarding the death of Henry IV, husband of Maria de Medicis, she collapsed. Having laughed at the accusations of magic, she wept when questioned about the dead king and made a bad impression on the judge. She was beheaded and cast into the flames. Voltaire opposed with violence and with ridicule the idea so popular in his time, of the frequency with which people were disposed of by poison. The most celebrated of women poisoners who experimented with poison on the sick she visited in the hospitals, and who was beheaded and burned for her crimes in 1676, Madame de Brinvilliers, has more crimes accredited to her than she committed, he says. He holds the same opinion in regard to Catherine de Medicis. It is only in recent years that it has become increasingly probable that he

was right about this; and that appendicitis, and kindred abdominal diseases were the real cause of many of the reputed cases of poisoning.

He understood fully the contagion which robs crowds of their wits. It is true that he had almost unparalleled opportunities for observing examples of hysteria in the convulsionists as they were called, who, in the XVIII century flocked to the tomb of the Diacre de Pâris, or the saint Pâris, in the remote little cemetery of St. Médard.

The miracles that were worked there were looked upon by the simple people as a recognition by the Almighty of the cult launched by the unhappy Jansen, who died without knowing what a fuss his earnestly conceived book was to kick up. Singing, dancing, groaning, grunting, barking, mewling, hissing, declaiming, prophesying, with the ordinary motor accompaniments of feeling, reached such a height in this hitherto quiet churchyard that the king found it necessary to close it —or, as a wit put it,

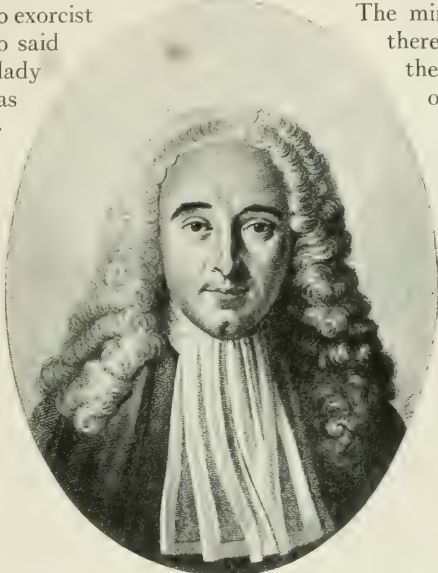
"By order of the king; God is forbidden to perform miracles in this place."

Voltaire wrote much about these occurrences, and analyzed them as did Collins,² who described them anew in 1908.

One of Voltaire's burlesques took the form of the following verse, relative to this famous tomb:

The deity, to lighten France's night
Within this tomb encloses all its might.
Hither the blind come hurrying; and then

² *N. Y. Medical Record*, July 4, 1908.



SILVA, physician to the Faculties of Paris and Montpellier.

With hands that grope their way, return again.
The halt come limping to this tomb, and all
Crying *bosanna*, dance and leap—and fall.
The listening deaf approach—and hear no sound.
“La Pucelle”—9-III-63.

In Voltaire's time, hospitals were in an overcrowded and unsanitary condition; filth was everywhere, contagion flourished, and, as Bass says of them, “even physicians declined hospital service as equivalent to a sentence of death.” Voltaire perceived the menace of the huge Hôtel Dieu and wanted it split up into a number of smaller pavilions, scattered in different parts of the city. Of hospitals in general he said:

“There is hardly a city in Europe today without hospitals. Turkey has them for animals, which seems an extravagant charity. It would be better to forget animals and save more men. The great mass of charitable institutions proves a truth to which little attention is paid—it is this, that mankind is not so bad as

it is painted; that, in spite of all the false opinions that he holds, in spite of the horrors of war, which change a man into a brute, it is easy to believe that this animal is really kind and only ugly when aroused, like other animals. The trouble is that he is teased too much. Modern Rome has almost as many houses of charity as antique Rome had triumphal arches and other monuments of conquest. The Trinité in Rome once maintained

445,000 pilgrims for three days—but perhaps that is an encouragement to vagabondage more than an act of charity, as pilgrims are usually tramps. Of all hospitals, the Hôtel Dieu of Paris receives daily more poor patients than any other. There are often from 4000 to 5000 at a time. In this case, the number defeats the purpose of the charity. At the same time it is the receptacle of all terrible human miseries and the temple of the true virtue



MARQUISE DE BRINVILLIERS trying out her poisons on the patients in the Hôtel Dieu.

which tries to succor them. It would be well to bear in mind the contrast between a fête at Versailles, between an opera at Paris, where all the delights and magnificence are united with such art, and of a hospital where all the suffering, despair and death are crowded together with such horror. Large cities are like that. In the charitable institutions, the drawbacks are often greater than the advantages. A proof of the abuse connected with them is that the poor devils whom they take there are afraid to be there. It

is especially bad when the town gets too big, when there are four or five patients in one bed,³ when a poor fellow gives the scurvy to the neighbor from whom he catches the smallpox. The futility and even the danger of medicine under these circumstances is proved. It has often been proposed to split up the Hôtel Dieu into several better situated hospitals—but the

³ Beds were built with the purpose of accommodating several people at once.

money is never forthcoming. It is easy to get it to send men out on the border to be killed—but then there is none left to save them with."

Voltaire's most striking characteristic as an author in general is his modernity, and this is particularly remarkable in that it continues into matters scientific. It seems less surprising that Euripides should have seen into the real hearts of men through the veils of symbolism that surrounded human customs in ancient Greece, than it is that a French wit and playwright and letter writer should have so unerringly picked out the truth from the many medical systems of his time.

Much that he says about medical subjects could be incorporated in textbooks to-day. He was dead before Pinel (1745-1826) wrote his first book, and yet in the article on madness in the *Philosophical Dictionary* may be found the same prophetic teachings which have made Pinel immortal as the savior of the insane.

"What is madness? It is having incoherent thoughts and conduct. Madness, during the waking state, is a disease which prevents a man from thinking and acting as other people do. No longer capable of directing his affairs, they are taken from him; Society excludes him for not being able to hold the ideas which suits it; if he is dangerous, he is shut up; if violent, he is restrained. Sometimes he is cured by baths, by blood letting, or by a chosen regimen.

"Such a man is not destitute of ideas; he has them, like every one else when awake and often when sleeping. One might ask how this immortal spiritual mind, the brain's tenant, receiving all its ideas by the senses, never delivers a sane judgment. It sees objects just as the minds of Aristotle and Plato and Locke and Newton saw them. It hears the same sounds and has the same sense of touch. How does it happen, then, that it collects

such an extravagant mess, without being able to make use of the perceptions it receives in common with the philosophers? If this simple and everlasting substance is subserved by the same instruments as serve the minds which are lodged in the brains of the wisest of men, why does it not reason as they do?

"I will admit at once, if my madman sees red and the wise men see blue; if, when these latter hear music, my madman hears an ass braying; if, when they are at church, my madman fancies himself at the play; if, when they hear

'yes,' he hears 'no'—why then his mind might think the opposite of what theirs do. But my madman has the same perceptions as they have and there is no evident reason why his mind, having been furnished with all the tools by the senses, should not make use of them.

"Close reflections make one suspect that the faculty of thinking, the divine gift to man, is subject to derangement like the other senses. A lunatic is a sick man whose brain suffers, as the gouty man is one who



Le diacre de Pâris.

is ill in hands and feet; he thought with his brain as he walked with his feet, without understanding his incomprehensible power of walking any more than he understood his incomprehensible power of thinking. There is a gout of the brain as well as of the feet. Finally, after all reasoning, perhaps faith alone can convince us that a simple and immaterial substance can be ill.

"The physicians say to an insane patient, 'My friend, you have lost common sense. Your mind is as pure and as spiritual as ours, but ours is well situated, while yours is not. For yours, the windows are shut—it lacks air and suffocates.' The patient, in a sane moment, might answer, 'My friend, you assume the question; my windows are as wide open as yours are, as I see the same things and hear the same words; so it follows that my mind makes good use of the senses, or that it is itself a perverted sense, a deteriorated quality, or my mind itself is insane, or else I have no mind at all.'

"One of the doctors might answer, 'My dear friend, perhaps God has created unbalanced minds as he has created balanced ones.' To which might be answered, 'If I believed that I would be madder than I am now. Come, you who know so much, tell me why I am mad.' If the doctors have a little sense left, they will reply, 'I do not know at all.' In a moment of lucidity, the madman might say to that, 'Poor fellows—you who do not know the cause of my trouble and cannot cure it, tremble lest you become just like me—or perhaps worse. You are of no better stock than Charles VI of France, Henry VI of England, or the Emperor Venceslas, all of whom lost the faculty of reasoning in the same century. Your minds are not better than those of Blaise Pascal, Jacques Abbadie, and Jonathan Swift, all three of whom died mad. The last of these at least founded a hospital for us. Would you

like me to engage a place for you in it?"

And by way of appendix he adds:

"I am distressed that Hippocrates prescribed asses' blood for insanity, and still more that the 'Manuel des dames' says that poor people become sane when they catch the itch. These are pleasing receipts; they appear to have been invented by the patients."

Voltaire wrote much about syphilis, the grand pox, as he called it. He draws distinction between it and leprosy and believed, as many of the best informed still do, that syphilis originated in America. Two things prove this, he says:

"First, that quantities of authors, physicians and surgeons of the XVI century attest the truth of it. Second, the silence of all physicians and poets of antiquity, who did not know this disease and never pronounced its name. This seems very conclusive. Physicians, from Hippocrates down, could not have failed to describe the disease, to name it, to see remedies for it. The poets, as mischievous as the doctors are industrious, would have spoken in their satires, of the clap, the chancre, the bubo, all the things which precede and follow this awful malady. You will find no word in Horace, in Catullus, in Martial, in Juvenal, which has the slightest relation to it, although they write freely of all the effects of dissipation. It is certain that the smallpox was not known to the Romans till the VI century, and that the American pox was not brought to Europe until the end of the XV century, and that leprosy is as different from both of them as it is from St. Vitus' dance.

In 1496, the Parliament of Paris passed a decree which read that all affected with the great pox who were not citizens of Paris, should leave town within twenty-four hours or be hanged. The decree was

neither Christian nor legal nor reasonable; but it proves that the pox was regarded as a new menace, which had nothing to do with leprosy, since they did not hang lepers who slept in Paris. Men can give leprosy to each other through dirt, but as for the pox, it is Nature that has made this present to America. We have already reproached this Nature, so good and so bad, so clear-sighted and so blind, for having defeated its object by poisoning the source of life, and we still lament being unable to find a solution for this terrible difficulty."

The societies for prophylaxis of venereal diseases might turn to their profit the conversation between the surgeon and his questioner in "L'Homme aux quarante Écus." The surgeon replies to the question as to how syphilis may be gotten rid of:

"There is only one way, and that is for all the princes of Europe to form a league, as in the days of Godfrey of Bouillon. A crusade against syphilis would surely be more sensible than those directed in old times against Saladin, Melecsala and the Albigenes. It would be better to form an agreement for the purpose of stamping out this enemy common to all humanity, than to be always busy watching for the right moment to devastate the earth and cover the fields with dead, for the purpose of filching from one's neighbor two or three cities or a few villages. I am speaking against my own interest, for war and the pox make my fortune."

It was inevitable that the speculation and experiments on a subject like generation, which were active in his time, should have excited the human Voltaire. Harvey, under the stimulus of his teacher, Fabricius, did an enormous amount of work on animals along these lines, and in 1651 published his book "Excitationes de generatione" and, as Voltaire puts it, took for his devise "*Omnium ab ove.*"

Before Harvey, practically all views had been molded on Aristotle's theory that the male parent furnished the body of the future embryo, while the female only nourished and formed the seed.

It was argument based on the denial of the maternal relationship that secured the acquittal of the accused in Æschylus's "Furies." Apollo defended Orestes charged with murdering his mother, Clytemnestra, by saying:

Not the true parent is the woman's womb
That bears the child—she doth but nurse the seed
New sown: the male is parent—she for him
As stranger for a stranger, hoards the germ
Of life, unless the gods its promise blight,
And proof hereof before you will I set.
Birth may from fathers, without mothers be:
See at your side a witness of the same,
Athena, daughter of Olympian Zeus
Never within the darkness of the womb
Fostered, nor fashioned, but a bud more bright
Than any Goddess in her breast might bear.

(Trans. by Morshead.)

In 1677 Leeuwenhoek communicated to the Royal Society of London the discovery which his pupil Hamen had made, by means of the microscope, of the living spermatozoa. Leeuwenhoek believed that the moving elements of the semen might be germs which enter the egg and become embryos. Opponents to this theory called them parasites, a view which is responsible for a part of their name.

It was not until after the death of Voltaire that Spallanzani proved by ingenious experiments that the spermatozoa were necessary for fertilization. So Voltaire was not the only one at sea when, in 1777, he devoted the ninth dialogue of *Evhémère* to this topic. *Evhémère* represents a philosopher of Syracuse, and Callicrate serves him as interlocutor, or "end man."

Callicrate — I have always been astounded that Hippocrates, Plato and Aristotle, all of whom had children, did not agree as to how Nature worked this

perpetual miracle. They all say that the two sexes coöperated in that each furnished some fluid; but Plato, putting theology ahead of nature, of course, considers nothing but the harmony of the number three, the engender, the engendered, and the female in whom the generation takes place. That constitutes a harmonious proportion for Plato, even if the accoucheur fails to grasp it. Aristotle limits himself to saying that the female produces the material of the embryo and the male determines its form. That does not help us much. Tell me, has no one seen Nature at work, as sculptors are seen making figures from clay or from marble or from wood?

Erbémère—The sculptor works in the open but Nature in the dark. All that we knew up till now was that the fluid is always spent by the male when he copulates, but that it is sometimes missing in women. But now a great English physicist, aided by certain Italians, has substituted eggs for the two generating fluids. This great dissector, Harvey, is more credible from the fact that he has seen the blood circulate; something which Hippocrates never saw and Aristotle never suspected. He dissected over one thousand quadruped mothers who had received the male fluid—but when he had examined hen's eggs, he conceived the idea that everything originates in an egg; the difference between birds and other species

being that the former set and the latter do not. A woman is a white hen in Europe, and a black one in Africa.

Callicrate—Then the mystery is cleared up!

Erbémère—Not at all. Recently all has been changed again. We do not come from an egg after all. It seems that a Batavian (Leeuwenhoek) has, with the microscope, seen in the seminal fluid of men a race of little beings, fully formed and running about with great activity. Many

curious men and women have since tried the same experiment and become persuaded that the question of generation is solved.

They thought they saw little men in the semen of their fathers. But unfortunately, the very activity with which the little men swam has discredited them. How could men who ran about so actively in a drop of liquid be expected to remain for nine months almost motionless in their mother's womb?

MADAME DU CHATELET, mathematician and friend of Voltaire.



Voltaire was forced to leave the question here.

"All theories," he said in a letter to Thiériot, "as to how we come into the world have been overthrown. The only thing that has proved changeless is the way people make love."

He was no slower than the rest of us, for two centuries, less two years, elapsed between the discovery of the spermatozoa, in 1677, and Hertwig's (1840-) demonstration in 1875, that fertilization is effected by the entrance of one spermatozoön into

the egg and the union of its nucleus with the egg nucleus.

In Voltaire's time, smallpox was still a terrible scourge. "Of one hundred people," he states, "at least sixty get smallpox; of these sixty, ten die and ten retain the marks. Thus this malady kills or disfigures one-fifth of mankind."

Voltaire had this disease when a young man and wrote his views as to the treatment of it. Personal experience may have stimulated his interest in the subject, but,

as far as inoculation was concerned, his interest was unselfish, as he was firmly of the opinion that smallpox never came twice to the same person. As he was the first continental to write of the new physics from England, so was he also the first real sponsor in Europe (1727) for variolation for smallpox, although Dr. La Coste had composed a brief note concerning it before any writings of Voltaire's on the subject saw the light and although the subject had been taken as an inaugural thesis by J. B. N. Boyer (1693-1768) of Montpellier in 1717. La Coste probably received the idea from reports to the Royal Society in 1714-16 by physicians who had visited Constantinople. The adoption of the practice in England was due to Lady Mary Wortley Montagu, who learned it from the Turks and who practiced it on her children in 1718, while her husband was Ambassador at Constantinople. This courageous action of hers preceded by eighty years Jenner's transference of the cow-pox from the milkmaid to James Phipps.



CATHERINE II, royal sponsor for inoculation in Russia.

Lady Mary Wortley Montagu combined determination with charm, but, as Voltaire said, she wrote for all peoples who wished to learn. In one of her letters from Constantinople, she said, "I would write our London doctors if I believed them big enough to sacrifice their own interest to those of humanity. But I fear their resentment, if I should undertake to lessen the revenue that smallpox brings them. But on returning to London I shall perhaps have zeal enough to open the war."

She did, and succeeded, and Voltaire reports that the doctors instead of opposing inoculation, took it up and were better recompensed by royalty for their inoculations than they would have been had they brought the dead to life.

Dr. Richard Mead, one of the wealthy possessors of the Gold Headed Cane, first practiced inoculation in England in 1721. Royalty came to the support of the cause, especially Queen Caroline of England, a woman whom Voltaire admired immensely. The Duc d'Orleans, King of Denmark, King of Sweden, and Queen of Hungary all had it done in their families.

Catherine II, Empress of Russia, wrote Voltaire in 1768, saying that Dr. Thomas Dimsdale (1711-1800) of England had come to Russia. He had inoculated 6000, with only one death, and that death a child of three. Catherine was inoculated and had no ill effects from the operation. She did not go to bed and saw company every day. Dr. Dimsdale made inoculations in Petersburg

in schools and in specially constructed hospitals, receiving as his fee £10,000 down and an annuity of £500.

It is interesting to note that at about the time that inoculation, or "buying the smallpox" as it was called, was gaining in England, an epidemic visited Boston, for the first time in sixteen years. The impassioned Cotton Mather, who had studied medicine for a time and who was the first American elected to the Royal Society (1713), aroused by the reports of the new method which he received from England, sent copies of them to the Boston practitioners, and Dr. Zabdiel Boylston (1679-1766) also a member of the Royal Society, first introduced (as is recorded on his tombstone in Boston), the practice into America. Within six months he had inoculated 244 persons. But several of his patients died and the Selectmen of Boston, with true Puritan insight, forbade its further practice, saying "that the operation tends to spread and continue the infection in a place longer than otherwise it might be." This fact of the contagiousness of inoculated smallpox was late in attracting the observation of Europeans. Voltaire does not speak of it. It was a feature of more importance in America than in Europe, in which latter continent the ravages of smallpox were so continuous and so widespread.

Inoculation was probably a folk custom originally and was prevalent in many primitive people and is still practiced in certain African tribes. But Voltaire's letter about it is no less interesting.

"It was an immemorial custom," he says, "for Circassian women to give smallpox to their children at the age of six months, by making an incision on the arm and by inserting in this incision a pustule from the body of another child. The inoculated child served as source of supply of pustules for other children.

Maternal instinct and tenderness introduced this custom in Circassia. The Cir-

cassians are poor and their children are very pretty and it is with the daughters that their chief trade lies. They supply the beauties of the harems of kings and of others rich enough to buy and maintain such valuable merchandise. They bring up the girls to caress men, to dance and to excite, by the most voluptuous artifices, the taste of the supercilious masters for whom they are destined. Every day the little girls rehearse their lessons with their mothers, like children who learn the catechism without understanding anything about it. But smallpox would make futile all these pains.

A commercial nation is always alert for its interests and neglects no information which might foster its trade. The Circassians observed that smallpox practically never came twice to the same person. They perceived, further, that benign smallpox leaves no mark and concluded that if a child of six months or one year had benign smallpox it would neither die nor be pockmarked, but would be rid of the disease for the rest of its life. So they treated their children in this way. The Turks adopted this custom and it became practically universal in Turkey. Of all those inoculated in Turkey or England, none die, except the very feeble, none are pockmarked, and none acquire the disease again."

He reproaches Louis XV, who died of smallpox, with not having profited by the examples of others and with not having been inoculated. But this reproach is hardly justified, as he states elsewhere that this monarch had had the smallpox as a boy of fourteen.

Years afterwards, in 1763, when inoculation, though current, was meeting with opposition, the Parliament of Paris ordered that the question as to its value should be referred to the faculties of theology and medicine. In a sarcastic pamphlet, Voltaire

says, "You gentlemen, who are the best theologians and the best physicians in Europe, you should issue an injunction against smallpox, just as you have against Aristotle's categories, against the circulation of the blood, against emetics and quinine."

Inoculation did not become general in France until 1756, and Voltaire was an old man when he addressed the following verses to that medical friend of his who had done most to make the practice accepted by the French, and who had 20,000 successful operations to his credit. This was Théodore Tronchin (1709-81), of Geneva, the same one who demonstrated that the "Colica Pictonum" was caused by lead used to sweeten wine, and who was the first to show that plumbism might result from water drawn through lead pipes. The verses were written on the occasion of Tronchin cutting short a visit to Voltaire to go to inoculate the king's grandsons.

A. M. TRONCHIN

Since your departure yesterday,
Renewed is all my suffering,
But I can bear it and be gay
Because I know you went away
To save the grandsons of the king.

Some prejudices serve an end,
But others grow like noxious weeds;
To triumph over these, one needs
A sage, a man of valiant deeds.
Your clever hands their aid did lend
When, long ago, I told my nation
(And youth, perhaps, was my excuse)
About inoculation.

Which—thanks to you in common use—
Was thought imagination
And met with foul abuse
Like Newton's *gravitation*.
I saw the truth, but could not then
The world of that same truth convince;
Nor was I hailed, before or since,
A prophet by my countrymen.

"How *can* we," people said, "believe
Truths made in England? How suppose
That any one can good receive
From those who are our foes?"

Ah, France, it was at last your fate
To ask of England all she knew,
Nor need we blush to imitate
Those whom we fairly overthrew.
For equally in all men's sight
The sun performs its daily race,

And Truth, impartial, sheds her light
In every age, in every place;
Let us—not asking whence they come,
Nor whose the honor and the praise—
Receive with joy her blessed rays,
And may the whole world be her home!

Besides these subjects, he wrote on fistula, which killed Richelieu. It was for fistula that Louis XIV paid the son of the elder Félix (d. 1703) in a property worth 50,000 écus,⁴ in return for the skillful operation he performed on him. Voltaire also wrote on the stone and on leprosy. He had the vagueness of view regarding gonorrhea which lasted till the time of Ricord (1799-1899). Of gout he made the remark that "it confounds the pretended art of medicine." He was very enthusiastic about the first veterinary school founded in France, in 1672, which was the beginning of veterinary medicine in Europe. He wrote its founder and director, Claude B. Bourgelat of Lyons (b. 1712) author of "Elements de l'art Vétérinaire" (Lyons, 1765-69),—"You are not like those physicians who without hesitation take the place of God and create a world with a word. You have opened a new career by the way of experience."

In his "Century of Louis XIV," Voltaire states that surgery, "the most useful of all the arts," attained its highest supremacy in France during Louis' reign. People flocked there from everywhere to avail themselves of the skill of the surgeons and to obtain the instruments which there attained the highest degree of perfection.⁵

⁴ The écu did not have a constant value, being worth between 3 and 6 livres, a livre being the equivalent of the franc. The purchasing power of the franc then and now is put at 1-10.

⁵ It was John Hunter who transferred surgical supremacy to England.

Voltaire's varied activities with the stage, with court life, with the wise investment of money, with agriculture, and with practically all the questions of his day, left him time to acquire a discriminating interest in the history and trend of the medical art, to fix his belief in its ideals and to make him jealous of its good name. But the fact that his writings on medical subjects represent so very small a portion of his works, makes surprising the accuracy of his knowledge of medical subjects, his free and correct use of medical terms, including those of anatomy, and his perception of medicine's final promise.

It would be interesting to know whether his observations and criticisms covering the theories of Newton and Descartes, his views of Locke and Spinoza and Helvetius and other philosophers, his statements in history, his opinions on law and on bees and lawyers and actors and authors and dancers came as near to the truth as his medical opinions. He is said to have failed to appreciate Shakespeare; but he seems to have

had a good line on Aristotle, and I for one am inclined to accord him the compliment of believing that he was right oftener than most men from the very fact that he was so often right in matters I happen to know about, but which were side issues to him.

His views of crime and punishment have not been improved much since his day. "Whoever gives himself a master," he says, "was born to have one." He saw dementia in all great crimes, and notes the religious fanaticism associated with so many of them.

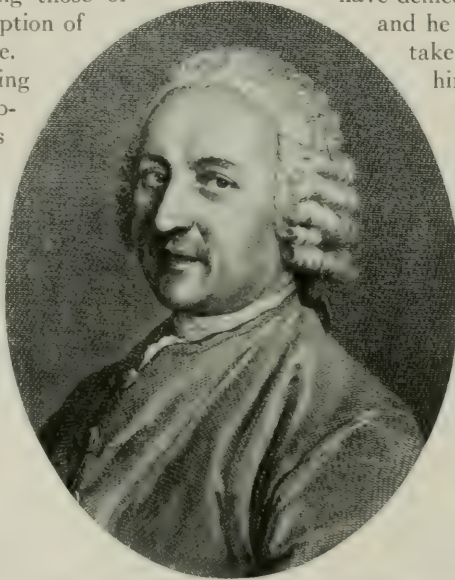
"Bibles, not Virgils," he says, "are found in the pockets of regicides." In illustration of this he cites the case of Jean Chatel, who attempted to assassinate Henry IV. The young man had conceived the idea from Jesuit priests that he was damned. He wanted to die, and contemplated a bestial crime in public, with the idea that he would be killed at once. He changed this plan to that of assassinating the king, and stabbed him in the mouth. The Protestant d'Aubigné wrote to Henry IV about this, saying, "You have denied God with your mouth and he has struck your mouth; take care that you never deny him with your heart."

As to capital punishment, Voltaire asks if it is reasonable to suppose that men can be taught to hate homicide when the magistrates are homicides themselves and kill a man with a great show. Should not the criminal make good the damage he has done his country by working for it—death makes nothing good."

To-day the great problem in education is that of selection, the organization of the

means to find out the faculties of the individual and to adapt education to the perfecting them. We find Voltaire realizing this already and saying that education in colleges and convents is bad, for the reason that there the same things are taught to a hundred pupils, all with different talents; and he makes *Candide* say, at the end of his varied and exciting experiences, that the thing for each one to do is, after all, to cultivate his own garden.

Regarding the importance of youthful



TRONCHIN, most prominent French inoculator.

impressions in forming character, he puts in the mouth of Zaïre, the Christian captive in Jerusalem, reared in ignorance of her faith and country, and beloved by the Mohammedan ruler of the region:

— the love that encircles and nurtures our youth
Molds our feelings and conduct and grasp of the truth.

A slave to false gods, I had been as sincere
As a Christian; in Paris; or Mussulman here.
The hands of our parents, their training, tho' brief,
Engrave in our heart every early belief
Which example and custom so often
retrace
And which, it may be, only God
can efface. II, 560.

In Charlot he brings out the Socratic doctrine, overthrown by Aristotle and revived in our days by Freud, that knowledge and virtue are the same thing. Le Marquis, an overbearing and spoiled young man, excuses himself to his mother by saying: "Je suis fort naturel," to which his mother, the countess, replies:

Oui, mais soyez

aimable—

Cette pure nature est fort insupportable.

Vos pareils sont polis; pour quoi? c'est qu'ils ont eu
Cette education qui tient lieu de vertu;
Leur âme en est empreinte; et si cet avantage
N'est pas la vertu même, il est sa noble image
Dompter cette humeur brusque, ou le penchant vous
livre,
Pour vivre heureux, mon fils, que faut il?

Savoir vivre.

A balance runs through his opinions which is truly remarkable for a man who took such personal prejudices as he did. He hated war, and relative to a hand-book of tactics by

Guibert, which was used by the French officers in this country during our Revolution, and which was later highly prized by Napoleon, he wrote:

Fevers, gout and catarrh and a hundred worse ills
With a hundred learned charlatans working their wills—

You might think the world evil enough as things are,
Without man's inventing the great art of war.⁶

But feeling in this way did not prevent him from realizing that "the nation best provided with steel will always subjugate the one which has more gold and less courage."

Dr. John Moore, a practitioner of London, whose letters about his travels gained him some literary reputation, while tutor of the young Duke of Hamilton visited Voltaire at Ferney in the last year of Voltaire's life (1778). He has left a lively picture which seems to have escaped the great Frenchman's English biographers.

"This skeleton," he writes, "has a keener and brighter glance of the eye than any human being, with

the vigor of maturity and all the advantages of the most bubbling youth. In his face may be read his genius, his penetration, and his extreme sensibility. He maintains a systematic correspondence with the whole of Europe, and from it he gets the news of all noteworthy events and all literary productions as soon as they appear. The greater part of his time he

⁶ For this and the preceding renditions of the French into English verse the writer is indebted to Mrs. Alice Duer Miller.



BOURGELAT, founder of first veterinary school in France.

spends in his study, reading or being read to, and always with his pen in his hand with which to make notes or comments."

He must have passed his whole life in the way Dr. John Moore describes his last days. With a pen in his hand and with his mind turning from his immediate surroundings to rove to the uttermost parts of the earth, keen for material and critical for the drawing of far-reaching conclusions.

Every fact, familiar or alien, served him for thinking. When William Cheselden (1688-1752), the English surgeon, and physician to Sir Isaac Newton, made an artificial pupil on a patient congenitally blind, thereby supplying him with vision, Voltaire was greatly excited at the discovery that it took the patient some time to acquire the idea of

distance. Apropos of this, he said, "It is impossible to be unhappy through the deprivation of things of which one has no idea."

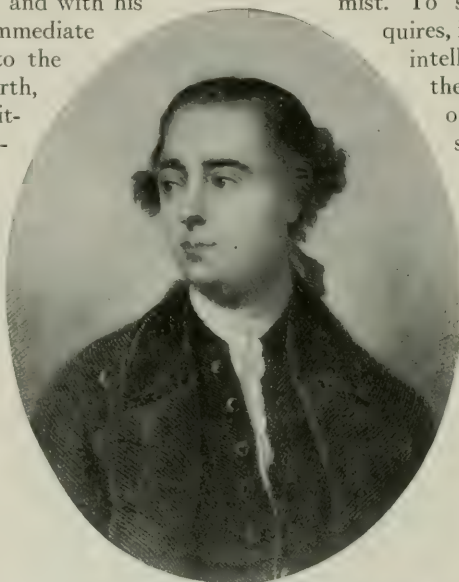
He possessed, perhaps better than any one, the capacity to look things in the face and, in spite of what he saw there, to maintain with humility the high level of his

constructive mental energy. It would be hard to find a more exacting test of intellect and courage than that—than to contemplate correctly the verities, and still show undimmed the feelings and actions of an optimist. To stand such a test requires, in addition to the purely intellectual critical qualities, the kind of understanding of humanity which is inseparable from the love of it.

Medicine, as well as other branches of learning, owes its chief debt to men like Voltaire, who were at once brave, knowing and humble. Voltaire used to say that his desire was to try and sow broadcast what he perceived so clearly himself. He complained that the fields were ungrateful, not realizing, perhaps, that only men of fiber like his own can grasp

truth firmly and hold it. Judged by the events which have had a bearing on the conclusions that he drew, he made singularly few errors in principle. He seems to have illustrated his own saying:

Le gout conduit pour le génie ne fait jamais de fautes grossières.



DR. JOHN MOORE, who left a lively account of Voltaire's activity during the last year of his life.

AN UNPUBLISHED BRONZE ÉCORCHÉ

By EDWARD C. STREETER, M.D.

BOSTON

IF proof were needed of the complete concurrence of science with the serious figure arts at Florence four hundred years ago, it could readily be drawn from the most cursory study of the bronze figurine reproduced on this page. This little bronze is scant six inches measurement, of brassy texture and without particular patina; it dates from the first quarter of the XVI century and is said to be the work of Jacobo Sansovino. With equal reason, we should think, it could be assigned to Andrea, Jacobo's teacher, pupil of Antonio Pollaiuolo who was "the virtual beginner of artistic anatomy in Italy."

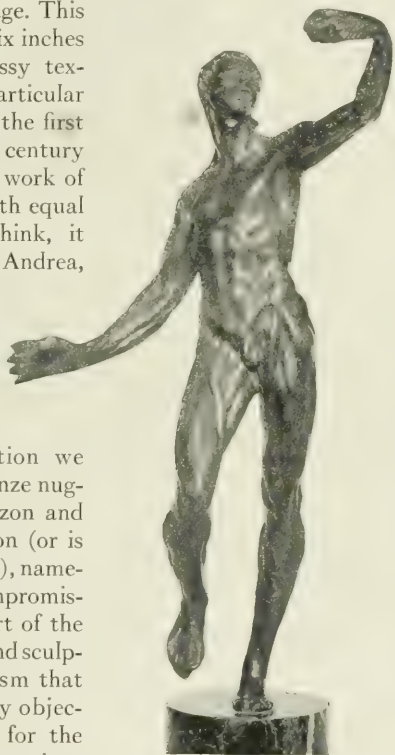
Whatever attribution we give it, this choice bronze nugget still serves to blazon and proclaim a new passion (or is it the revival of an old?), namely a passion for uncompromising realism on the part of the great figure-painters and sculptors of Florence; realism that led into paths of purely objective inquiry. Artists, for the nonce, became anatomists. "Art ceased to be symbolic and became scientific." Actually, at times, more human dissections were performed in the city of Florence by masters of art than by the appointed masters of Medicine. Anatomy was a discipline which no worker "in the round" could ignore. To such it was the supreme enabling gift. It meant

technical excellence, power to portray pressures and mass beneath contour. It gave reality and firm substance to the representations of form and movement. It brought fresh vision and vigor to assail each vital plastic problem.

The new naturalism, aiming at a scientific reproduction of nature, took the Florentine Schools by storm. No "bottega" but felt the vast stir of this momentous development. The "Ars et Mysterium" of figure-drawing and of form-modeling was revolutionized; her ancient ante-chambers converted into veritable halls for dissection. Donatello and Andrea del Castagno witnessed anatomies; Pollaiuolo and Verrocchio, their pupils, *performed* them. From 1450 until the decline of the school of the Carracci at Bologna, anatomy had a more or less secure place in North Italian schools of Art. Leonardo, Michelangelo, and all their spiritual offspring. Piero della Francesca, Luca Signorelli, Andrea Mantegna, Roselli, Piero di Cosimo, Andrea del Sarto, Pontormo, Rosso Fiorentino, Montorsoli, Sebastian del Piombo and scores of others might be cited as men who were held in thrall to this

new technique at the basis of unclouded draughtsmanship.

But only the powerful ones among these artists could secure bodies on which to make their studies and preparations. Subjects,



XVI Century Italian bronze figurine of an écorché or flayed man. Attributed to Jacobo Sansovino.

(Reproduced by permission of Gimpel and Wildenstein)

too, soon became unserviceable. Scarcity and impermanency of material thus led artists to adopt the plan of making a sustained and systematic series of drawings of such parts as they needed. These current studies of the scale of parts and the essential myologic details, i.e. "omnes musculi sub cute immediate locati," circulated among pupils and minor craftsmen. "I pray you remember on coming to Rome," writes Seb. del Piombo to Michelangelo, "to bring along some of those drawings of legs, bodies or arms, which I have wanted this great while, as you are aware." Such drawings did valiant service, as did casts in gesso, preparations in wax, etc. But results registered in haste, on materials liable to destruction, were further enriched and supplemented by the anatomical notes taken down by sculptors in perdurable bronze. Of the precise way in which this was done, our little *écorché* forms a shining example.

Life-casts of the human figure were taken even by the Giottesschi, but it remained for the men of the Cinquecento to develop those intricacies of labored anatomy found in the *écorché*. We have found that knowledge of the superficial and skeletal muscles was essential alike to the sculptor and the maker of little bronzes, for it gave the possessor a neat and quick vein for molding the outer form with the utmost finesse. The call for the *écorché* was insistent, and, we assume, fairly met. Mathias Duval gives in his "*Histoire de L'Anatomie Plastique*" (Paris, 1898) some scattering comments on the notable replicas of flayed figures in collections abroad,—but he is woefully incomplete. He fails to mention Marco Agrati's "St. Bartholomew" in Milan cathedral, the most impressive flayed figure extant. Duval reproduces the *écorchés* attributed by tradition to Michelangelo and Bandinelli, also that of Ludovico Cardi (Cigoli, 1559-1613),

whose wonderful wax figures were modeled for his master Allori. He mentions the lost anatomical modelings of the Spanish artist Gaspar Becerra, who redrew the Vesalian plates for J. Valverde's *Anatomy* (and there-to added a spirited muscle-man of his own contriving, suggestive of St. Bartholomew). Duval gives no data dealing with Italian figurines of the Renaissance.

In all, about ten "musclemen" in this class of little bronzes are partially described, or at least known to exist, to-day. Of these, three are in the Berlin Museum, one in the Louvre, two in the Victoria and Albert Museum, one in the Royal College of Surgeons. The one in the v. Rho collection in Vienna and this one in the possession of Messrs. Gimpel and Wildenstein account for nine. Then there is the germane plaque described by Bode: *Berichte XXXIII, Abb. 105*. Other pieces doubtless, similar to these, exist in private hands. All the great collections such as the Morgan, the Pringsheim, and others in southern Germany and Italy, should be scrutinized anew. The above list by no means exhausts the possibilities.

Finally it must be admitted that in the matter of attribution much remains to be done. Where experts such as Dr. Bode and Goldschmidt oscillate perpetually, like shore birds minus the hind toe, as between John of Bologna, Francavilla and Prospero Beresciano, what can an ignorant searcher do but muddle along as best he can and "welter in the prevailing chaos"?

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BURKE AND HARE AND THE PSYCHOLOGY OF MURDER*

By CHARLES W. BURR, M.D.

PHILADELPHIA.

THE people whose lives I purpose discussing are immortal in criminal annals on account of the number and the nature of their crimes. Their life histories offer abundant material for a clinic in criminal psychology, and they are the more useful as subjects for study because of the simplicity of their characters. They do not present that tangle of different tendencies, that fighting of different motives, shown by more complex natures. We are prone to associate simplicity with goodness but there is a simplicity of evil as well as of good and these people possessed it. There are fewer unknown quantities in the equations of their characters than are present in people of more complicated mental makeup. The simplest human mind is complicated enough, but in Burke and Hare the solution of the problem as to why they were criminals is a little less hard than in men and women of more complex and higher natures in whom there is a struggle between good and evil before they succumb wholly to evil. Their vocation was to murder people in order to sell their bodies to teachers of anatomy. They were not originators of the trade, nor do I know who was, but they were the only, or at all events the most notorious, wholesalers. Years before their appearance on the scene, as early indeed as 1752, Helen Torrence and Jean Waldie were executed in Scotland for a similar crime. It seems that these women had promised some students, they themselves being nurses of a sort, to obtain a body for them. They were unsuccessful, so one day meeting in the streets a woman

and a little boy eight or nine years old they tempted her with drink and she, nothing loath, accepted. While one woman entertained her the other took the boy to her own house and there and then suffocated him with the bedclothes. They were paid for the body two shillings and tenpence, and an extra sixpence to her who carried the burden, but they themselves paid by going to the gallows.

Body snatching, we must not call it stealing because there were no property rights in a dead body in those days and the resurrectionists were careful always to leave the grave clothes, began in Edinburgh from scientific necessity. The government required that students should dissect but did nothing to provide material. Anatomical advance could not be made save by studying the human body: the physicians of continental Europe were making great discoveries and the Scottish faculty had no intention of being left behind in the search after knowledge. Montieth proposed, in the last decade of the seventeenth century, that if he were allowed to have the bodies of poor people dying in the workhouse who had no one to bury them he would treat the living poor free and, more than this, do for anatomy in a few years more than had been done in Leyden in thirty. His proposal was accepted with certain restrictions but the supply of bodies was still too small. To help out, and because they were not suffering from over-refinement and much enjoyed sport of the rougher sort tinctured with danger to life and limb, medical

*Read at the meeting of the Section on Medical History of the College of Physicians of Philadelphia, Nov. 21, 1916.

students became body snatchers and this led to such grave scandals that finally a clause was put in the indentures of students (they served apprenticeships in those days) binding them not to take part in violating graves, but I do not think that physicians, teachers of anatomy at any rate, ever very seriously sought for, or, when found, very severely punished the youths who visited graveyards at night with rope and shovel. Every now and again there were outbursts of popular anger on account of the desecration of graves and about 1725 Monro's anatomical establishment was destroyed by a mob. Not only students but sometimes physicians deprived the worms of their food and Dr. Pattison of Glasgow was arrested and tried but acquitted on legally interesting grounds. It was proven that the body or parts of the body produced in court were from a woman who had never had a child while the woman whose body he was accused of stealing had been a mother. Though acquitted, public feeling was so strong that he had to emigrate to America. During the whole time that body snatching lasted, until it became associated with murder, the law-making body took much less interest in the matter, regarded it much less seriously, than the people. This was partly because, as a rule, the bodies taken were those of the friendless and the poverty-stricken who rarely left behind any one who had any interest in what became of either their bodies or their souls, though sometimes, especially if the deceased had had an interesting disease with interesting lesions, even important people were not safe in their graves.

Things came to a climax with Burke and Hare. They created a new industry or, at least, formed the first, and I think the only copartnership, the business of which was the selling of the bodies of people they murdered. Others had done this occasionally, casually, before, and others did it later but they alone made it a business.

They never robbed graves; murder was much easier and less laborious. Fortunately their business career lasted only a short time, but it was carried on in a rather wholesale fashion since confessedly they committed sixteen murders between the 12th of February and the 1st of November, 1828.

They were led into murdering as an occupation by the following almost accidental occurrence. Burke, his mistress Helen M'Dougal, Hare and his wife, at least she figured as such, all lived together in Edinburgh where Hare ran a vagrant's boarding house. An old pensioner named Donald, a harmless, useless old man, not a criminal but one of the many unfortunates who from inborn inability was never able to lay by much for old age and hence could not, nor is there evidence he much desired to, live among the thrifty and clean, boarded with Hare. He died owing Hare four pounds and Hare decided to get this back by selling the body. The parish authorities sent a coffin to the house and the body was put in it but Hare and Burke, while left alone, ripped up the coffin lid, took out the body, hiding it in the bed, and replaced it by tanner's bark of which there was aplenty in the yard. They sold the body to Dr. Knox's assistants, William Ferguson, later Sir William, and Thos. Wharton Jones. The fee they received was seven pounds ten shillings. This was easy money and being men of criminal instincts and not mere weaklings led astray, the usual excuse of criminals, and not being, or at least not thinking themselves, the victims of the crimes of respectable society, the most up-to-date and erroneous explanation of crime, but wanting money and neither of them having any conscience to boast of, they decided they would take up murder as a business because the wage was high and the labor light.

Their method may be illustrated by an early case, that of Abigail Simpson. She

was a drunken old hag who lived in the outskirts of Edinburgh. Hare, ever on the lookout for game, saw her on the street, thought she was a likely subject, accosted her, was met in friendly spirit, and took her home to Log's house in Tanner's court (Log was Mrs. Hare's first husband). Here she was plied with liquor and the crew danced and sang, and swore and drank still more. Next morning Abigail was sick, very sick, and cried to be taken home to her daughter. Instead they gave her, pretending kindness and friendliness and pity, more whiskey and porter and she again became helplessly drunk. Now was the time. Hare placed his hand over her mouth and nose and Burke laid himself across her. She made no resistance, and soon was dead. They bundled her body into a chest and afterward sold it to Dr. Knox for ten pounds. There is no need to relate the other murders since they were all done in the same way. Men and women, often of the outcast class, were first made friends with by offering them a drink or even sometimes a home, and they unsuspecting and very happy that some one in their hard world had been kind to them, drank to stupor and then were suffocated because that left no wound. Wounds on the body might have led to unpleasant questions as to how they came there.

There was a break in the partnership for awhile. The agreement was that each was to share in the proceeds of every murder even though only one did it. Burke was out of town for a time and when he returned found that Hare had more money than he could account for. Hare denied that he had been doing business on his own account but Dr. Knox said he had bought a body recently. A fight ensued, not on the ground that Hare had not played fair—that only happens among the criminals of fiction, but because Burke wanted money. Bloody and fierce as the fight was neither man so far forgot himself

as to say anything that would make the neighbors suspect he was anything more than a highly respectable resurrectionist. This will give some inkling of their power of inhibition, of their real self-control. After the fight Burke and M'Dougal went to live with John Broggan, whose wife was a cousin of Burke's, but he soon became friends with Hare again and business relations were resumed.

One murder more than all the others aroused the people of Edinburgh, indeed of all Scotland, in righteous wrath against these men. It was that of James Wilson, called Daft Jamie. He was what, in the old language, before science had given long hard names to the different kinds of imbeciles, before enthusiastic sociologists had accepted the hypothesis that all things can be cured by education, and before men, i.e., ordinary unlearned men, had begun to have opinions about everything but still believed that feeble-mindedness, like most things, was a visitation of God, just happening so and not produced by inevitable and irremediable causes, was called a natural. Everybody in Edinburgh knew and liked or at least warmly pitied him. He was a familiar figure in the streets. He was harmless and happy, earning a precarious living by fetching and carrying. He was medically interesting (though not to many of the scientific men of his own day) because he was one of those imbeciles who have a prodigious memory for useless things, e.g., he knew the number of the street lamps in the town. He also had a fondness which some of us believe, it may be because, to use present day slang, we are "highbrows," always indicates mental weakness, a passionate love of conundrums. He lived in holes and corners, hurting no one and hurt by none save the young barbarians of the street who hooted and plagued him. He, instinctively knowing discretion was the better part of valor and "being too proud to fight," always ran away

when they appeared. He was suspicious of no one past boyhood, so one day when Mrs. Hare accosted him on the street and began to talk to him, he willingly accepted her invitation to go to her home. When they arrived there she offered him drink: he demurred at first but finally drank to drunkenness and Burke and Hare, who had meanwhile been summoned, smothered him, not, however, without a long hard struggle, for he was strong and not completely under the influence of drink, and sold his body. He enjoyed a brief immortality or, to use more accurate language, a transient post-mortem fame, from doggerel verse peddled on the streets but now hidden, dust covered, in the libraries of medical antiquarians.

The murder that led to discovery was that of a woman named Docherty. She disappeared. Inquiries were made and it was evident that Burke or Hare or both had killed her. Several questions confronted the city authorities: Could the crime be proved against both? Was it better to let one of the guilty persons escape punishment in order to be sure of convicting the other by his corroborative evidence? If one (or rather one couple because there was evidence against the women) only was to be tried which ought it to be? Who was the leader? It was decided (and I think quite justly though there was much public anger at the time) that Burke and M'Dougal were the guiltiest or at least the two against whom the evidence was strongest. The trial began December 24, 1829. Hare was accepted as a state witness. Burke was convicted, M'Dougal given a verdict of not proven.

It was not a day of indecent delay between verdict and execution: courts of appeal could not intervene, because they did not exist, and executive act quickly followed judicial word. Soon after the judge sentenced a man to hanging the man got hanged and there was an end of the business. This

method has much to recommend it. Our friends the eugenists ought especially to approve of it, because certainly the best way to prevent bad stock from being propagated is to hang or otherwise kill its members. This English and Scotch juries did and it is very possible that Great Britain's relative freedom from crime against the person during the Victorian era (a freedom in marked contrast to our own noble age and glorious country)—an era so full of sound sense, social pomposity, and scientific rationalism now so rapidly fading away, was in part due to the fact that previous generations had let a good bit of blood and so purified the citizenry.

It was a day of public hangings and the place of Burke's execution was Lilberton's Wynd. Crowds watched, during the night before, the building of the scaffold and when finally the transverse beam was fixed in place the multitude gave rousing cheers. As a rule it was difficult to get men to build a scaffold but this time carpenters aplenty, more than enough, volunteered. Many hours before the time set (Jan. 28th), people gathered in larger and larger numbers. Thrifty householders, not averse to making an honest penny, sold windows overlooking the execution place at high prices and people stayed in the houses all the night before in order to be sure they would not lose their places. Speculators bought rights to the use of windows and roofs and resold at a profit, reasoning it was an ill wind that brought no one good and that thrift was praiseworthy. The night before was cold, rainy, dismal, but that did not deter the crowd from wanting to be in time to get a good place to see justice done and a man suffer. On the morning of the execution the rain ceased and the crowd increased to twenty or thirty thousand. It was not a serious-minded, quiet crowd; on the contrary it was a merry mob, cracking jokes, laughing, shouting, playing tricks, wanting to be amused and yet withal bloodthirsty.

At eight o'clock in the morning the march to the gallows started and as soon as the condemned man appeared he was met with yells and cat calls and demands that Hare too should hang. Burke seems to have been the most self-contained man there. He walked, news reporters say, though they perhaps were no more accurate than reporters of to-day, with steady step. He was unkempt, dressed in a black suit much too

large for him, and lacked all the externals necessary for dignity, yet he seems to have shown dignity, at least the dignity of self-control. When the rope was adjusted to his neck he stood composed, unflinching, motionless. With a gesture as of impatience, at least on-lookers so interpreted it, he gave the signal to let the drop fall. A cry, many cries of satiated vengeance, greeted the fall which really was only a few inches and did not cause instant death. The crowd waited and watched and when several times the body jerked convulsively roars of anger broke forth. The conduct of these people is a good example of what

to-day we call mob psychology, which is nothing more than imitativeness and an unconscious desire to follow a leader: individual initiative and inhibition break down, individual opinion ceases or rather all succumb to the stronger will of the leader. It does not matter whether it is a street mob, or, in a democracy, a gathering of legislators. The nature of its acts, good or evil, depends

merely upon lucky or unlucky chance, whether saint or devil, wise man or knave happens to control. In this case the mob was justified in its anger, but its conduct would have been the same if the man had been innocent. Not many years before in Paris, another mob had cried for blood and made obscene jokes and laughed as the tiger laughs with a snarl and roared and swore when an innocent man suffered by the guil-

lotine not for his sins but for his fathers' and the mob's fathers' sins. Louis XVI went to his grave no more execrated than Burke though by a larger number of less respectable people.

Burke being dead the mob wanted vengeance on Dr. Knox. Their anger broke forth and only the police prevented murder.

The day after the execution Burke's corpse was taken from the lock-up house to the college and placed in one of Dr. Monro's rooms. Here a sort of private view was first held, Mr. Liston, Geo. Combe, the phrenologist, and Sir William Hamilton being among those present. Mr. Joseph, an eminent sculptor, made a bust. The

affair seems to have been quite fashionable. Some visitors noted with surprise the placidity of the features of the corpse, forgetting, just as novelists are prone to forget, that in the palsy of death there is, there must be, placidity. The cases in which death stiffening comes so quickly as to fix the features in their last expression are rather apocryphal. The eye usually sees what it looks



Portrait of Dr. Robert Knox lecturing his class. This picture was made by Edward Forbes, one of his students. It appeared in the *Students' Maga*, and was reprinted in Lonsdale's "Life of Knox."

for and the subconscious mind of the average man expects to find the mark of Cain even in death in the features of a murderer and hence usually finds it. The onlookers who made the observation must have been, as indeed they were, men far above the common, for they saw what was, not what, from their preconceptions ought to have been but was not. Professor Monro dissected the body in public and the police had to stop a crowd of too enthusiastic students: enthusiastic I fancy not for knowledge.

Monro found the brain normal, but Combe and the other phrenologists found that Burke's character was just what the bumps indicated because the bumps indicative of badness negated those indicative of goodness. They were consistent enough and clear seeing enough to find bumps of both qualities.

The most interesting question is, what manner of people were these four who made a business of murder. I include the women because though M'Dougal was dismissed from court with the verdict of not proven, and Burke to the end said no word against her and Mrs. Hare was never tried, there is no doubt the women knew what the men were doing and were morally guilty. We can learn something from their lives.

William Burke, the son of a laborer, was born in county Tyrone in 1792. He had some education and his parents were not criminals. In this he followed the rule, for murderers are more often the offspring of weak than of criminal people. As a youth he entered the service of a Presbyterian pastor as a servant but soon tiring of this, he worked in turn as a baker, a weaver and a shoemaker. He learned no trade thoroughly, and this is characteristic of his mental type, and after trying his hand at several he volunteered in the militia as a fifer or a drummer. After a time the regiment was disbanded and (now married) he again became a servant. He quarreled with his

father-in-law, deserted his wife and went to Scotland about 1818. He became a laborer on the Union canal and there by chance or fate the actors in the drama all came together. He met Helen M'Dougal who had never been an altogether good person. She had had a child by M'Dougal while his wife lived and when she died lived with him and bore his name until he was carried off by typhus. Then she went with Burke. The priest tried to induce him to go back to his wife but he suffered excommunication rather than do so. Really she seems to have been a proper, honest person and a true wife but something in M'Dougal held him, that strange affinity of protoplasm, quite as real, quite as resistless as chemical affinity and having just as much, or as little, to do with intellect or beauty as it has: the thing brutality cannot kill nor kindness create. They went to Edinburgh and lived in "the Beggars' Hotel." He became a cobbler again and M'Dougal peddled the old shoes he begged or bought and repaired. The hotel burned down and MacGregor (the historian of Burke and Hare, basing his account largely on "The Westport Murders," a book printed at that time) states he lost among other things these books: Ambrose's "Looking unto Jesus"; Boston's "Fourfold State," "The Pilgrim's Progress"; and Booth's "Reign of Grace." MacGregor says these books probably belonged to the M'Dougal woman because they were the kind found in every Scotch home but that Burke all through life was "of a naturally religious turn of mind and that in all his after actions, brutal and godless as they were, the inward warning voice never left him at peace, except when his senses were steeped in drink." Helen M'Dougal seems to have been regarded as the principal bad influence in Burke's life but he never made the old excuse "the woman tempted me and I did eat": whether she was really the stronger character and like that greatest murderess in drama, Lady Macbeth, led her man to

his own destruction remains unsolved. At all events the two stuck together till the end, almost ten years, notwithstanding fights and brawling. Once he beat her almost to death but still they remained together. In 1827 they went to live with the Hares.

Hare was Irish. He also worked on the Union canal and met his mistress there and lodged at Log's house. He later became a traveling huckster selling fish, crockery, and old iron. He was always fighting, always drunk and could neither read nor write. His father was a Protestant, his mother a Catholic. He was about twenty-five years old at the time of Burke's trial. A man who saw him says "he possessed not the slightest moral perception of the enormity of his conduct." "His forehead was low as in all murderers" (this may be another example of things being as we see them because not a few murderers have majestic foreheads, and many passable ones), "the eyes watery, curiously shaped and having a look between a lure and a squint." He was five feet six inches tall and "a poor silly looking body."

An anonymous literary professor in the University is quoted as saying that Burke, whom he examined, was an intelligent man, strong-minded and with understanding above his position though his conduct displayed nothing like remorse or contrition. "His education," the professor continues, "and rank in life, instead of having been by any means of the lowest order, were such as, in the judgment of the world, and on the authority of experience, are held of necessity to humanize and inform the mind, and to communicate perfectly just conceptions of moral distinctions." This may be a beautifully balanced sentence and grammatically and rhetorically worthy of a professor of literature but it states untruth as truth. Rank in life and schooling, and that is what the professor means by education, do not prevent crime nor change potential criminals into honest men.

Margaret Hare was Irish. Log, her husband, a decent man, cut small parts of the Union canal and she, dressed as a man, worked like a man. She seems to have been, without knowing it, an early believer in the emancipation of women. On leaving the canal they went to Edinburgh and kept a lodging house for vagrants and he sold things in the street. He died. She had an affair with a young man but he left her and she took up with Hare. Her first child by Hare died of neglect, if not by murder, and one other lived.

What became of the Hares and M'Dougal after the trial no one knows. Years after tales were told that one or the other of them had been seen in one place or another but nothing was sure.

The great question in the study of the minds of murderers is, Are they a type apart, separate and distinct from other men, or are they, even as the rest of us, led to murder by external causes? Before answering the question we must define our term: What do we mean, what do psychologists and alienists mean, by murder? We may dismiss at once killing in self-defense. But psychologically speaking we exclude several other acts resulting in killing. We of course exclude the frankly insane,—the man who, influenced by delusions of persecution kills, as he thinks, to save himself; the maniac, who in his madness neither reasons nor knows, but kills blindly, and the dement who is so deprived of reason that he does not realize the nature and consequences of his act. Further the sane man who, beside himself with rage, kills is not necessarily a murderer. He is responsible, it may be, for he should not allow himself to get into a murderous rage but he is different from the real murderer. The murderer from the psychologist's point of view is the man who without any temporary change in his usual psychic condition can coldly contemplate and leisurely plan the killing of another for his own seeming benefit. Such a man psycho-

logically is a murderer whether he ever kills or not. He is in the same class if, after planning the act, he must drink to give himself physical courage to do it or if he simply plans and hires some one else to carry out his desire. Men of the murderous type are fortunately rare but they constitute a distinct psychologic species of the human race. They are what they are not on account of environment but because of their inherent nature: They are the victims of their protoplasm. Men are born, they do not become, murderers. Social standing has nothing to do with the frequency or infrequency of their appearance. Wealth does not prevent their entrance into the world nor poverty produce them. Education, in the sense of training in self-control and suppression of the emotions, may help a little in curing or rather making them control, their instincts but book learning, even carried to extreme erudition, does not alter a man's nature one jot or tittle. Neither intellectual wealth nor intellectual poverty is a factor in their production.

All classes of men, as they are classified

by external qualities, have given examples of murderers.

The one quality I have found lacking in all the sane murderers I have ever examined was the moral sense, and by that I mean the realization that one owes a duty to others, that others have the right to live. They are, as some one has said, color blind to morals. I have never known a murderer, as here defined, who felt remorse or who grieved at the dead man's fate. I have seen more than one who ate and slept well while awaiting execution and the man who eats and sleeps well is not suffering any emotional pain. What causes absence of the moral sense we no more know than we know what produces it. That it is entirely separate and distinct from intellect I am convinced because I have known men who, mentally far above the average, lacked it entirely. Further, so far as my experience goes, nothing creates it in him who has it not. I have more than once studied murderous criminals whose environment in childhood and youth was of the best and yet who went their own terrible way. The only cure for them is death and the best treatment execution.

HEBREW PRAYERS FOR THE SICK

By C. D. SPIVAK

DENVER, COLO.

THERE is no doubt in my mind that of all therapeutic measures with which the primitive man used to defend himself against his greatest enemy—disease, prayer was the oldest, even older than hemostasis which Weir Mitchel so beautifully described in his poem “The Physician.”¹ We will go a step farther and assert that even unto our day the majority of mankind turn to prayer first or last in disease, especially in the “last disease.” The prayers may differ in their content, in the manner they are offered or to whom they are addressed, but the orthodox, the agnostic and the infidel are all offering up a prayer for recovery. Wishing is praying, and who, if sick, does not wish with all the intensity of his soul for recovery? The confidence reposed by the sick in his attending physician is tantamount to a prayer. To quote Professor James: “Few men of science can pray, I imagine. Few can carry on any living commerce with ‘God.’ Yet many of us are well aware how much freer in many directions and abler our lives would be were such important forms of energizing not sealed up.”² In fact Dr. Hyslop said before the British Medical Association at their meeting in

1905 “that of all hygienic measures to counteract disturbed sleep, depressed spirits and all the miserable sequels of a distressed mind, I would undoubtedly give the first place to the simple habit of prayer.”³

But whether prayer can no longer do for the men and women of the present day what they have done or supposed to have done in the days gone by, it certainly deserves from the medico-historical standpoint careful study and a sympathetic consideration.

I have limited myself to the simple labor of collating the material from the domain of Hebrew lore, beginning with the Bible, and following with the material scattered in the two Talmuds, Midrashim, etc.

JEHOVAH WOUNDS AND HEALS

Jehovah causes “consumption, burning ague that shall consume the eyes and cause sorrow of the heart” (Leviticus xxvi, 16). “He smites with fever and with an inflammation and with extreme burning with the botch of Egypt and with the emerods and with the scab and with the itch—with madness and blindness and astonish-

With tender doubt the tortured member feels
And, first of men a healing thought to know,
He finds his hand can check the life's blood flow.”

(“The Physician.” By S. Weir Mitchel. Transactions of the Congress of American Physicians and Surgeons, 1900, p. 91.)

² “The Varieties of Religious Experience,” by Professor James.

³ Quoted in “Psychological Phenomena of Christianity,” by Cutte. (1909, p. 412.)

¹ “The hunt is o’er—the stone-armed spears have won;

Dead on the hillside lies the mastodon.
Unmoved the warriors their wounded leave;
The world is young and has not learned to grieve.

“But one gentler sharer of the fray
Waits in the twilight of the westering day,
Where ‘neath his gaze a cave-man, hairy, grim,
Groans out the anguish of his mangled limb.

“Caught in the net of thought the watcher kneels,

ment of heart (Deut. xxviii, 22, 27, 28). He makes the "plagues wonderful, of long continuance and sore sicknesses" (Ibid. 59). He can bring "all the diseases of Egypt" (Deut. xxvii, 60) and moreover he can bring "every sickness and every plague which is not written in the book of the Law" (Deut. xxviii, 61). Jehovah therefore is looked upon as the efficient cause of disease. He can consequently remove the cause, for he says "I wound and I heal" (Deut. xxxii, 39). It is natural that one stricken with disease should appeal to Jehovah for relief.

THE SHORTEST PRAYER ON RECORD

The text of only one prayer for the sick is recorded in the Pentateuch. When Miriam spoke against Moses her brother because of the Ethiopian woman whom he had married, the anger of the Lord was kindled and behold Miriam became leprous, white as snow. Aaron appealed to Moses on her behalf and begged "Let her not be as one dead, of whom the flesh is half consumed when he cometh out of his mother's womb" (Num. xii, 12). And Moses made a prayer which is the shortest on record. It consists of five short words: "El no rfa na la," "Oh God, do thou heal her, I beseech thee" (Num. xii, 13).

PRAYING FOR RECOVERY

Abraham prayed for the recovery of Abimelech (Gen. xx, 17). David prayed for the recovery of his little son (II Sam. xii, 16). Elisha prayed for the recovery of a boy (II Kings iv, 33). Hezekiah prayed for his own recovery (II Chron. xxxii, 24). There are recorded in the Bible hundreds of cases of death, but no mention is made of any prayers having been recited for their recovery.

JOB IS PRAYERLESS

Job is the personification of misery, and the description of his sufferings is

harrowing. He curses the day he was born, and the night in which he was conceived. "When I lie down I say, When will I arise, and the night be gone? and I am full of tossings to and fro unto the dawning of the day. My flesh is clothed with worms and clods of dust, my skin is broken and become loathsome" (Job vii, 4, 5). But Job prays not. He rages and fumes. He cries out, "I will not refrain my mouth; I will speak in the anguish of my spirit; I will complain in the bitterness of my soul—Why hast thou set me as a mock against thee so that I am burden to myself?" (Job. vii, 11, 21). His wife too seems not to believe in the efficacy of prayer. For not only does she herself not pray and does not counsel her husband to pray, but on the contrary she encourages him in his defiance: "Dost thou still retain thine integrity? Curse God and die" (Job ii, 9).

DAVID IS PRAYERFUL

The sweet singer David is the antithesis of Job. He believes in the Lord and in his ability to heal him of all disease. The following prayers for recovery are incomparable for loftiness of style, for the simplicity of expression, for the graphic description of disease and for the childlike confidence in Jehovah:

THE PSALMIST'S CONFIDENCE IN JEHOVAH'S POWER OF HEALING

"Into thine hand I commit my spirit—Have mercy upon me, O Lord, for I am in trouble: mine eye is consumed with grief, yea, my soul and my body. For my life is spent with grief and my years with sighing; my strength faileth because of mine iniquity and my bones are consumed" (Ps. xxxi, 6, 10, 11).

"Yea, though I walk through the valley of the shadow of death, I will fear no evil; for thou art with me; thy rod and thy staff they comfort me" (Ps. xxiii, 4).

"Blessed is he that considereth the poor:

the Lord will deliver him in time of trouble. The Lord will preserve him and keep him alive—The Lord will strengthen him upon the bed of languishing; thou wilt make all his bed in sickness" (Ps. xli, 2, 3, 4).

DESCRIPTIVE PRAYERS

"O Lord, rebuke me not in thy wrath; neither chasten me in thy hot displeasure. For thine arrows stick fast in me, and thy horn presseth me sore. There is no soundness in my flesh because of thine anger, neither is there any rest in my bones because of my sin—My wounds stink and are corrupt because of my foolishness—For my loins are filled with loathsome disease, and there is no soundness in my flesh. I am feeble and sore broken: I have roared by reason of the disquietness of my heart—my heart panteth, my strength faileth me; as for the light of mine eyes, it also is gone from me" (Ps. xxxviii, 1-10).

"Have mercy upon me, O Lord, for I am weak; O Lord, heal me, for my bones are vexed—I am weary with my groaning, all the night make I the bed to swim, I water the couch with my tears" (Ps. vi, 3, 7).

"Their soul abhorreth all manner of food, and they draw near unto the gates of death. Then they cry unto the Lord in their trouble and he saveth them out of their distress. He sent his word and healeth them" (Ps. cvii).

"The sorrows of death compassed me and the pains of hell gat hold of me—For thou hast delivered my soul from death, mine eyes from tears and my feet from falling. I will walk before the Lord in the land of the living" (Ps. cxvi, 3, 8, 9).

"Bless the Lord my soul, and all that is within me bless his holy name—who healeth all thy diseases; who redeemeth thy life from the pit—who satisfieth thy mouth with good things so that thy youth is renewed like the eagles—As for man, his days are as grass, as the flower of the field so he flourisheth. For the wind passeth

over it and it is gone, and the place thereof shall know it no more" (Ps. ciii, 1, 3, 5, 15, 16).

"Hide not thy face from me in the day when I am in trouble; incline thine ear unto me: in the day when I call answer me speedily. For my days are consumed like smoke, and my bones are burned as a hearth. My heart is smitten and withered like grass; so that I forget to eat my bread. By reason of the voice of my groaning my bones cleave to my skin" (Ps. cii, 4, 5, 6).

"For my sighing cometh before I eat and my roarings are poured out like water" (Job iii, 24).

"O Lord my God, I cried unto thee and thou hast healed me. O Lord, thou hast brought up my soul from the grave; thou hast kept me alive that I should not go down to the pit" (Ps. xxx, 3, 4).

FIGURATIVE PRAYERS

"Praise ye the Lord—He healeth the broken in heart, and bindeth up their wounds" (Ps. cxlvii, 1, 3).

"He (the Lord) keepeth all his bones; not one of them is broken" (Ps. xxxiv, 21).

"The Lord raiseth them that are bowed down" (Ps. cxlvi, 8).

"Consider and hear me, O Lord my God; lighten mine eyes lest I sleep the sleep of death" (Ps. xliii, 4).

A PHILOSOPHIC PRAYER

"Lord make me to know mine end and the measure of my days what it is, that I may know how frail I am. Behold thou hast made my days as a handbreadth, and mine age is as nothing before thee. Verily, every man at his best state is altogether vanity, Selah" (Ps. xxxix, 5, 6).

THE PRAYER OF YOUTH

"I said, O, my God, take me not away in the midst of my days" (Ps. cii, 24).

THE PRAYER OF OLD AGE

"Cast me not off in the time of old age; forsake me not when my strength faileth" (Ps. lxxi, 9).

LARYNGOLOGY AND OTOTOLOGY IN COLONIAL TIMES

By STANTON A. FRIEDBERG, M.D.

CHICAGO, ILL.

THROUGH the kindness of Dr. Fielding H. Garrison, of Washington, I have in my possession a manuscript which contains so much of value to the history of early American medicine that I have considered it a duty to present at length in a separate paper the subjects that are of special interest to those of us engaged in the practice of laryngology and otology. No attempt will be made to enter into a close analysis of the matter presented, my object being only to place in a permanent state the information contained in the work with the hope that it may be of some benefit to future historians.

The author of, or at least the sponsor for, the manuscript was Matthew Wilson, a minister and at the same time a physician, an association of professional activities that we would consider unique at present but which we find occurring very frequently in our early history. Although a native of Chester County, Pennsylvania, where he was born January 15, 1734, he found the field for his active career in Lewis, Delaware, where he lived until his work was ended March 30, 1790.

His education was directed by Dr. Francis Alison, a minister of prominence, a patron of learning, and a man of great intellectual force and power. As rector of the University of Pennsylvania, his name, I believe, may be found on the first American medical diploma.¹ There is no evidence that Dr. Wilson possessed a degree in medicine. By his biographers it is stated that his medical studies were pursued under the tutelage of the Rev. Dr. McDowell, likewise a man of great versatility and of considerable influence in his day and time.

Dr. Wilson was licensed to preach in 1754, and two years later was installed as pastor of two congregations, one at Lewis and the other at Cool Spring, Maryland. A few years later another congregation was added at Indian River. Coincident with the assumption of his ministerial duties he engaged in the practice of medicine, and in addition gave instruction at a nearby academy in Hebrew, Latin, Greek, and the learned sciences. Although so busily occupied for nearly twenty-nine years, time was not lacking for him to participate in the solution of important religious as well as the grave political questions preceding the Revolution.

Viewed in any light, he was indeed a remarkable man. To quote Thacher,² "the joint functions of minister of the Gospel and physician were sustained and discharged by him with an ability and popularity which evinced he was a man of extraordinary talents, attainments, and energy. His ardent industry and the comprehensiveness of his mind reduced every obstacle, and embraced every object of knowledge. He wrote an able compend of medicine, which was called a Therapeutic Alphabet. Commencing with the classification of Sauvages, it contained the diseases in alphabetical order, with definitions, symptoms, and method of cure. It was prepared for the press, used by himself, and transcribed by his students, but never published."

It is from this Therapeutic Alphabet that I have taken the material that will be presented. The book itself is a small, thick volume, bound by hand, and made up of over three hundred leaves. It is very evi-

dent that a number of individuals took part in the transcription as is shown in the variations of penmanship, spelling, punctuation, and corrections. The construction of the text also varies; in some places the style seems almost modern while in others we have the quaintness common to writers of that period. Several of the articles have the signature, M. Wilson, appended. As is stated in "The Preface by the Editors," Wilson himself wrote the articles on the principal diseases, but the definitions of the lesser complaints were generally translated by his pupils from Vogellius, Cullen, Linnæus, Brooks, and Sauvages. Regret is expressed that on account of the multiplicity of the author's business, time did not permit him to examine into the correctness of these translations by a comparison with his own notes.

There are two title pages, the second being separated from the first by a number of intervening pages upon which are written the preface, præcognita and prognostics. The title pages differ only in minor details, with the exception that at the lower part of the second occurs the statement that "it is now transcribed from M.W., D.D. Notes, &c., by Thomas B. Chraghead & other students. A.D., 1787, January, 29." From this date it may be seen that the contents of the manuscript are the result of an experience extending over the years from 1756 to 1787, truly the most epoch-making period in the life of the colonies. Had the intention to print the work been carried out it would have been the first book on the practice of medicine published by an American author.

The title page reads as follows:

*Multum in parvo
being a new
Therapeutic—Alphabet or
A Pocket-Dictionary, of
Medicine, Midwifery, & Surgery;
extracted from
Short Medical Notes on about
Nine Hundred Diseases, in both*

*their Technical and English names;
with many new and old successful Remedies,
important Precognita, Crises & Presages;
Containing a concise yet full History &
Theory of all the Principal Diseases, with a——vulgar
and Medical Recipes adapted to the Middle States of N.
America.*

*By Matthew Wilson D.D. Presbyter &
Physician at Lewes, about 29 years.
Nullius addictus jurare in Verba Magistri. " Hor.*

To every candid Reader.

*As America, in any Northern Latitude, is more
than ten Degrees colder than the same Latitudes in the
Old World; so in experience it is very certain that the
Diseases, even of the same Name are very different:
The Physical Writers, therefore, in Europe do often
lead young American Physicians into fatal Mistakes.
—To prevent this & be of some use to my Country was
the Design of permitting the present Publication, in
this rough unpolish'd Dress.*

M. WILSON.

In selecting the various subjects of laryngological and otological interest the text has been closely followed with here and there an addition or change in punctuation to render the meaning clearer. It will be noted that most of the articles are short and concise. Definitions of diseases with their cross references are given in order that a proper conception may be had of the exact comprehensiveness of the medical knowledge of Dr. Wilson and his pupils. The prevalence and importance of the different diseases may be judged by the amount of space devoted to their description and treatment. A reference to the various throat conditions will show the lack of anatomical and pathological distinctions common to the medical knowledge of the period. In the account of the "Throat Disorder in America," the disease which is now recognized as diphtheria, the work of Douglas is mentioned. In a note under "Quinsy Malignant" is the statement of an Epidemic Cynanche in which New York physicians found a new membrane in the larynx. This undoubtedly refers to the work of Samuel Bard and

Richard Bayley. A full description of early American literature on the throat distemper may be found in Elsberg's "Laryngology in America."³ Wright in his history⁴ has analyzed carefully the steps in the progress of the differentiation of the various throat diseases from the earliest times down to the present day.

THE THROAT DISORDER IN AMERICA.

This dire contagious, putrid & nervous Disease began in N. England A.D. 1735 & gradually moved on Westward, thro' most Part of North America. Children & young People were more generally affected, yet some Old Persons have died of it.—It prevails most among the Poor and Scorbutic, who feed much on Pork & live in wet & low Grounds.—In Some Families it spreads like the Plague—Others at the same Season take it without Opportunity of Contag (ion)—Some have it very mildly & none die, & yet I have heard of 4 Children dying in one House in a Few Days.—It will often keep in a Neighbour (hood) for some years—Some have it more than once. Some seem to have it long hatching, before it breaks out as appearing by the Languishing Scorbutic Habit, Corrosive Humors &c.

Symptoms.—The common attending Fevers (but seldom Nausea or Vomiting) putrid Heat, but moist & seldom parch'd.—A frequent irregular Pulse—Countenance dejected—Lowness of Spirits—The Tongue much furr'd, we continues to the Tonsils & Throat.—When milder the Tonsils only swelled, wt white spots, at most $\frac{1}{2}$ an Inch Diameter—thrown off from Time to Time in Cream colour'd sloughs—When these come off the Tonsils appear deeply pitted & corroded—The Sloughs soon renew again—Sometimes the Throat is swollen internally & Externally, and frequently mortify—But generally the Swelling does not endanger Suffocation—Sometimes they im-

posthumate—The last Symptoms are Oppression great of the upper Part of the Chest, difficult breathing, a deep hollow hoarse Cough—livid Countenance—Then Death.—N. Some walk about till near Dying, their Danger not apprehended by their Friends—Some die the 4 or 5 day—others the fourteenth—The putrefaction is so great that nature cannot excite a Fever, when they die suddenly of a Mortification.

Cure: It was long at first fatally treated as an Angina, with the usual Evacuations—And it is still fatal when Physicians are unacquainted with the manner of treating this uncommon Malady.—All Evacuants in general are Fatal—Bleeding—Blistering—Purging—Sweating hasten fatal Mortifications. And what is surprising tho' so putrid Cold-Air, & Jesuits Barks are pernicious.—All Flesh Meats, Fish, & Spirits are very hurtful. At last it was discovered by Dr. Douglas of Boston that the only Way to cure it is by confining the Sick to Bed in a gently moderate Warmth for many Days—Giving very small Doses of Snakeroot, but not to sweat, but only a gentle Diaphoresis with Sage Tea, for some time after all the Symptoms Disappeared.

N. It has also been found when mild to be attended with a Miliary Eruption on the Skin.—Hence Calomel join'd with Camphire has been thought to answer the same End as these Eruptions.

N. All greasy Applications are hurtful.

N. Gargles are useful of Sumack Burries, Snakeroot &c a little Allom dissolved in it.—Gargle before Swallowing.—

N. Wash ye sores wt Tinct. of Myrrh & Aloes wt Honey.

N. Externally Poultices of Rue & bitter Herbs. Sal Ammon wt. sharp Vinegar.

N. Some have had Sores in other Parts, even ye Privates, & less in the Tonsils, & were relieved in the same Way.

N. Wine freely to a Glass every few Hours has cured some very low in Nervous Fevers—

See Putrid Fevers, Typhus, Scarlatina, Biliosa &c.

Acataposis:—Is a difficulty of swallowing. Vide Angina.

Aglutitio:—Is a deprav'd swallowing. Vide Angina.

Ageustia or *Agehustia*:—Is a diminish'd or deprav'd taste. Vide gastritis.

Angina—Quinsy:—Is a pain, Tumor, inflammation of the Fauces, with a continual, inflammatory nervous or putrid Fever; attended with a difficulty of Breathing or Swallowing or fear of Suffocating. Vid. Cynanche.

There are five species enumerated. The Best Rule is to treat according to the Fever. If inflammatory: Bleed the Arms & under the Tongue, blow Allum often in the Throat—Purge wt Glysters, Give Nitre, Steams of hot Vinegar—, Puke wt White Vitriol, Anodynes etc. See under Quinsy ye Theory. If Putrid, Dont Bleed, but Puke & Suit the symptoms. Contrayerva is good, blow Allum, Poultis wt Jews Ears, or Rue or Horehound Leaves, & a little Milk, Stew'd with Salt & Vinegar. Internally Vin Antimon, Camphor, Bathe wt Saponacious Liniment, Gargle wt Tincture of Myrrh or Acid Elix; Use Barks & Snake-root with Wine, Exercise, Milk in Decoction of Alder.

Gentle Sudorifics, Check Purging, Some Syringe the Throat with Acet. Egyptiacum &c. If nervous & Suffocative the Mucus is thickened to a membrane, (Endemic here), it is cured wt Mercury by thinning the Mucus, by its accrimony with Anyodynes, Sudorifics; Salivation does it no harm. Bathe with Volatiles, Saponacious Balsams &c. Convulsiva—Vide Angone *cujus est species*. See Sore Throat.

Angone:—Is a Spasmodic, sharp choaking of the Fauces without an inflammation. Vide Asthma.

Cure; By a Dose of Opium, Camphor, Volatile & Traumatic Balsam mixt together. Repeat if needfull, this Cured an Epidemic

(at Indian River) after great numbers had died. This scarcely failed, only blowing Allum Powder in the Throat &c.

Anosmia:—Is a defect of Smelling. See Nervosi Morbi.

Antipathia:—Is a particular Aversion to an Object of Sight, Smell, or Taste, so as to be thrown into grievous Symptoms by them, as Col. Robertdeau at a cat & Mrs. Boyd at the smell of Tar & mySelf at Cod Fish.

The Cure is commonly Death.

Aphonia:—Is a deprav'd Voice and the same wt Paraphonia. This may be from many Causes. If from Cold see Catarrhus. If from a Fright see Hysteria. If from Lues Venerea, see Scorbutis. If from any other Cause, remove the Cause. But if from ill-configuration of the Parts, it seems incurable.

Aphthae; *Thrush*:—Are little whitish Ulcers affecting all parts within the Mouth & sometimes the Pudendum.

The Cure:—Vomit Infants wt the vinum Antimonii gut. 5-12 in Breast Milk. Vide Erysipelas from which it differs only by the Weather.

Juice of Horehound mixt with Honey & give a little often. Give also Cathartics, Alteratives, Antiseptics, Astringents inwardly. Externally wash with Juice of Green Persimmon & Loaf Sugar, or rusty Nails and Vinegar, or with Horse Radish Root Juice or Strong Tea of Oak Moss wt a little Honey, and Allum to wash the sores &c. Vide Mouth Sore. N.B.: Onion Juice cures it by sending it to the Skin in dangerous cases.

History & Theory of the Thrush.

Aphthae:—for which there is no English Name, unless Sore Mouth or Thrush, is a frequent and fatal Disease, especially among Infants, & pregnant Women in this Place, tho' little considered or understood. These are small, round, superficial Ulcers, on the inside of the Mouth, which Boer-

have found on Accute inquiry to be the Exulcerations of the Excretory Ducts of the Glands, which separate Salivary Humours & convey them to the Mouth. Now this Fluid rendered too thick and Viscid stops up the Extremities & Causes them to inflame, in all parts where ever these Excretory Ducts should discharge themselves as the Lips, Gums, Cheeks, Tongue, Palate, Fauces, Uvula, Throat, Stomack, & Intestines. In low and Marshy Ground, & in hot & rainy Seasons, Infants & Old People are most affected by the Aphthae.

The Prolegomena or Causes.

Continual putrid Fever, wt a Diarrhea, or Dysentery, perpetual Nausea, Vomiting, loss of appetite, Febrile Anxiety, Pain at the Pit of the Stomack, often returning; great Weakness; considerable Evacuations; Stupor, & Heaviness, but perpetual Drowsiness & pain about the Stomack. Those that appear at first with one Pustle, and are afterwards white & Pellucid like pearls, unequal, are mild & safe. Those which first appear in the Throat like New Bacon with a white thick crust, beginning in the Stomack, & slowly Ascending to the mouth, these are Opaque because of thickness, & very dangerous. Those which appear over the whole mouth wt a hard firm thick tenacious kind of Crust, turning brown, yellow, or livid, are very often Fatal. But those which break out in the same way, & then turn black, are worst of all, & commonly take life. The sooner the Separation the better; the longer before they fall off, the more dangerous to the Patient. The Salival Juices are discharged, thro' the whole internal surface of the Mouth, in order to be mix'd with the Aliments in Mastication; there are also numberless mucous Cryptae, or Cells in the back of the Tongue, Tonsils, Velum of the Palate, Pharynx, and Gula, which excrete thick Mucus for the Lubrication of those parts. But the eruptive Aphthae happen when this Mucous Hu-

mour is inspissated, and cannot be Driven thro' the Ducts, but Adheres and blocks up the Openings into the Mouth, as may be seen through a Microscope. Nine days are said to bring the Crisis of this Fever—but sometimes it goes much longer.

The Aphthae or Thrush are Seldom Observed in hot Countries except in some Infants; for being more thin and lax, they are more disposed to perspire & Sweat. Sweats & Urine carry off the Aphthae, if copious & render them mild. Hence all diets, drinks, & nursing which interrupt these are always detrimental. Van Swieten, (If I recollect the Author) Observes when Aphthae don't appear, as in Hot Countries, then Miliary Spots white & red, are frequently to be seen on the Skin; and conjectures that the Humor deposited is the same. The Miliary Eruptions and Aphthae attend the same Diseases & such accute Fevers as have the same disagreeable smell of Vapid Vinegar.

He remarks the miliary Eruptions or Pustules are filled with similar pelucid Liquor, perfected above the Cuticle, & after they dry up, that they scale off, & are often renew'd as in the Aphthae. Both are preceded by Anxiety about the Heart, Weakness, Slight but continual dosing, & unequal intervals. If the Aphthae & Miliary spots suddenly disappear, there is great danger of their oppressing the Stomack & Heart. N. Then there is no hope, but by expelling the Aphthae again outward to the Skin. Stupor, & Heaviness presage the Aphthae; sometimes they thicken The Ductus Communis, & Pancreas, (not having the way clear into the Duodenum) by a thick Aphthous Crust; there is great Anxiety, about the Precordia. But when the obstructing Crust is removed, we need not wonder that the accumulated bile, breaks loose; Hence the severest gripes in the Bowels, almost Excoriated, & hence dangerous Diarrhoeas & Dysenteries arise. Hence on giving a Purge a fatal Hyper-

catharsis may suddenly arise from the Acrid Bile & Pancreatic Juice, rushing into the excoriated Bowels. N. a Salivation follows the Thrush, before the Dilated Vessels can recover their former size.

Now the Stomack & Intestines being in the same State, it is no wonder that the body is exhausted like a Consumption after it by the Purging &c. N. Aphthae of the Mouth in Pregnant Ladies may cause Abortion by destroying digestion, and absorbing of the Chyle. But she needs nourishment for two bodies, of which the weaker, the Foetus, dies.

N. A Hickup at the beginning is worse than at the End of the Aphthae, as denoting the Stomack lined with thick Aphthae. N. Cold Applications in this Disease are Dangerous.

Cure: Whey, Vapour Baths, Weak Panada, Gargarisms, Glysters, Corroborating healing drinks, as Alder & Mallows, & Soot, M. in Tea with Milk. Jellies constantly on the Tongue &c &c. with the Remedies first Mentioned.

Apogeusis:—Is a defect of Taste. Vide *Ageusia*. Find the Cause and try to remove it.

Apophlegmatizantia:—Provokers of Spitting. These stimulate the Glands of the Palate, Fauces, and Salival ducts, & purge off the viscid Phlegm. They are proper in defects of Taste, Hardness of Hearing, to drive viscid humours from the Head, in Catarrh & Obstructions of the Fauces. They are preservative Agt. contagious Diseases. V. *Salivantia*. Tobacco chew'd or Smok'd, Chewing Hickory Bark, Ginger, Mistletoe, Mercury &c.

Arcditas:—Is a dryness of the Skin, Nostrils, Mouth & Tongue from a dissipation of the Watery Juices by the febrile Heat; while the impervious Blood distending the Vessels make the skin rough & dry. Vid. Typhus, Sore Throat &c.

Asaphia (*Aphasia*?) :—A Defect of the Voice. Vide *Aphonia*, *Cophosis*, *Muti-*

tas. See Sauvages ingenious Treatise of *Mutitas*.

Balbuties:—Is a Stammering & Loosing Letters in Speaking. Vide *Psellotis*. See kinds of it in Sauvages Chap. vi.

Battarismus:—Vide *Balbuties*.

Blaesitas:—A depraved Pronunciation of the Letters S & R. Vide *Traulotis*.

Black Dry Tongue:—Worst Presage in Fevers owing to a Deficiency of Lymph, or when the larger Vessels, surcharged with Blood, press & stop the smaller. Hence the Tongue, Index of the Stomack, is dry and gangrenous. See putrid Fevers.

Bronchocele or *Goitre*:—Is a large swelling which is formed on the fore part of the Neck, between the Skin & the Wind Pipe, & sometimes hangs from the Neck like a large Bladder; It contains atheromatous, steatomatous, fleshy, or honey-like Matter. See *Encysted Tumors*.

Bronchotomy, the Operation:—This Operation is chiefly useful in the Angina, when the Throat is exceedingly enlarged by the Tumor of the Thyroid Gland & Part adjoining, called, *Bronchocele*, which pressing on the Trachea, prevents the free Course of the Air to & from the Lungs. It is an incision made in the *Aspera Arteria* to admit the Air to the Lungs to preserve Life, in a violent compression of the Larynx.

Frightful Cautions have been laid down by Writers, for fear of dividing the recurrent nerves, or the great Blood Vessels. But there is scarce any danger at all; for they lie quite out of the reach of any Instrument in a tolerable cautious Hand.

The Manner is simply this; Pinch up the skin a little below the Tumor, but as near it as you can if it be low; & make an Incision quite thro' the Skin, three quarters of an Inch long. It is commonly in the 3rd or 4th Ring of the Trachea, but the Tumor will not sometimes permit you to choose the Place. Then part the lips of the

Wound, make a small transverse Incision into the wind-pipe & immediately introduce a Silver Cannula, near half an Inch long, wt a couple of little Rings at the top of it, thro' which pass a Ribband to pass round the Neck to keep it fast in the Wound.

N. After the Patient is cured of the Quinsy, & can breathe by the natural passage you may withdraw the Tube, which leaves only a Simple Wound and requires only a superficial application.

Capistrum:—A Spasm closely & immovably shutting up the Mouth. See Spasmus Maxillae inferiorii. See Opium.

Catarrhus—*Catarrh*:—Is perhaps the most common Disease in our County, yet the least examined or understood. When People are taken wt it, they only say they are very poorly, & have caught a bad Cold, & no further Notice is taken of it, 'till it frequently ends in dangerous Pleurisies, Peripneumonies, Consumption &c. It may be defined "An Unusual Defluxion of Lymph, Serum or Mucus, from the Glands about the Head, Jaws & Throat, exciting a Cough, distressing & frequent. It is attended wt Hoarseness generally & an inflammatory Fever."

The cause is called taking Cold, tho' in fact it is more frequently by Violent Heat; however, it is generally caused by a Diminution of insensible Perspiration, the outward Skin being exposed to the Air, Whereby a Plethora arising, the great Author of Nature has provided an internal Perspiration by the Mucous Cryptae of the Skin of the Mouth, Fauces, Bronchiae, Lungs, &c. But too great quantities collected in these, by the Heat of the Parts becoming Viscous, are cast off, after they have caused much trouble & Irritation by Coughs, Sneezing, & Running at the Nose, until more be collected, which stuffs up, & often rattles in the Breast. This frequently produces wt is called the Catarrhal Fever

& often produces mild Consumption, called the Deffluxion on the Lungs.

Catarrhs are distinguished according to an old Verse:

"Si fluat ad pectus dicatur rheuma Catarrhus;
Ad fauces, Bronchus, ad Nares esto Coryza."

Besides an obstructed Perspiration, some other causes may produce Catarrh, as the Stoppage of usual evacuations, or Natural Secretions as of Urine &c., or as Weakening digestion as only to produce a Watry Chyle & Blood, when its fluid Parts will escape more easily by the Numerous Glands about the Head. Prognostics here are easy, if the Catarrhal Matter, is but little, & not Acrid & discharged only by the Nose, the Cure is easy. If discharged by the Throat it is more difficult. But when it is very Acrid, & falls in a copious Manner on the Lungs, especially in one advanced in Years, or who is liable to Cough, Asthma, or Consumption, it is both very difficult & dangerous.

Cure in general; Softning the Serous humours, drinking large Draughts of Hydromel warm, or Tissots Elder Flowers, Balsam Traumatic, Vomits, Blisters, Anodynes wt Camphor, Antimon, Vin., Flannel Shirts, Cough Mass, Volatiles, Issues, Smoking Tobacco.—See Peripneum. Catarrh., See the Theory of Opium. More particularly The Diet should be soft, smooth, & balsamic; most Authors agree to give a gentle Vomit at first, if the strength will permit. and if the Patient be Phlethoric or Asthmatic Bleeding may be necessary, but in no other Case. It will be necessary to give gentle Purges as

R

Infus. Sena.....	℥ iij
Mannae.....	℥ i
Sal Glauber.....	℥ ss
Aq. Nux Muschatae.....	℥ ij
M.S. Potio Mane Sumanda.	

If there be Restlessness, & Anxiety, give a gentle Anodyne, with large Draughts of

Rosemary or Bran Tea &c. made into Hydromel & a Stronger Purge of Rusl's Pills or of Soap & Alloes.

When the Cough is troublesome:

R	
Conserv. Rosar,	
Syrup. Balsam,	
Syr. e. mecon.....	āā 3 i
Spt. Vitriol. tenuis.....	q. s.
ad levem Aciditatem, m. cap. cochl.,	
subinde, urgente Tussi,	

or else,

R	
Terr. japan.....	3 ij
Bal. tolutan.....	3 j
cog. in Aq. font.....	3 xii ad 3 viij
colat, add	
Syr. e mecon.....	3 ij
M. cap. cochl.....	ij
h. s. et urgente Tussi	

After removing the cause, it may be necessary to thicken the Juices & restrain the Flux of sharp Acrimonious Matters.

R	
Conserv. Rosar.....	3 i
Bals. Coccatalli.....	3 ij
Sperm. Citi, Terr. japonic.....	āā 3 i
Oliban pulv.....	3 iss.
Syrup. Balsam., q. s. m.f. Electar.	
Dos. q. n. m.	

In the meantime Cupping & Blistering & Issues may be applied to the side or part affected, according to the Symptoms. Also to divert the Defluction from falling on the Lungs, let him use freely Diuretics & Diaphoretics for some time.

R	
Therac, Androm, Oliban.....	āā 3 ss.
Gum Ammoniaci, croci.....	āā gr. v
Syrup q. s. f. Bolus, to be taken three times	
a day.	

Lime Water & Milk & Tar Water, & Tea of Pine Buds, or Pine saw dust, or grounding, & Sassafras will make good, common Drink, not much inferior to the above elegant Forms from London. See Treatise

under Phthisis. See Syrup of Horehound under Tussis from a French Physician.

Catarrhus Suffocativus:—Is a very difficult Respiration, Attended wt a sudden Interception of the Senses & Motion, snoring & intermitting Pulse. See Pnigma, Bleed, Vomit, Bathe, purge, Barks of Alder, Tea of common Scotch Thistle &c. See Asthma, Angina.

Cionis:—Is a painful thickness of the Uvula & Palate. See Angina & Sore Throat.

Clamor:—Is an anxious Exaltation of the Voice; often in Mania.

Clangor:—Is a Sharp screeching Voice. See Paraphonia. See Sauvages.

Coryza:—Is an extraordinary Running of a thin Serum from ye Nose or a Catarrh of the Nostrils. See the Latin Verse under Catarrhus.

Cough:—See Tussis, Pertussis, Catarrhus. Syrup of Horehound or Sulphur & the Yolk of an Egg, or take Barbadoes Tar, Honey & ye Yolk of an Egg &c.

Cynanche:—Quinsy: Is an inflammatory & sometimes putrid Fever; attended wt pain & Redness in ye Fauces, a difficult swallowing & Breathing wt a Sense of Straightness in ye Fauces. See Angina, & Quinsy. If Inflammatory: Blood under Tongue, in ye Arm or Feet. Bathe Feet in warm water, blow Alum or Nitre into ye Throat often. Apply a Chin Stay of Bals. Sapon. or Camphorated Spts., purge by Mouth & wt Glysters. Blister if pain in ye Head. Gargle the Throat with Oak Oose or persimmon bark wt Ol. Vitriol & Honey, Snuff Honey. Apply Poultises of Jews Ears or Horehound, plantane & Vinegar. If putrid; Mercury is called a Specific. V. Malignant quinsy.

Dysphagia:—A difficulty of Swallowing wtout any remarkable difficulty in Breathing. Vide Angina.

Epistaxis:—Is a Profusion or Haemorrhage of blood from ye Nostrils, wt pain & heaviness of ye Head, Redness of ye Face. Vid. Hemorrhagia, Haemorr. Nar. &c.

Original Epistaxis:—is a Haemorrhage from a Plethora. Symptomatic Epistaxis: are 1st from internal Causes: Febrile Haemorrhage, critical Haemorrhage, insalutary Haemorrhage. 2nd: From external Causes; common Haemorrhage, Haemorrhage by Leeches &c.

Cure: Bleed Feet, Purge, Sweat over bath of Cedar Tops, Epithem in each Nostril of Pulv. Alumen, on Lint &c.

Fauces:—Pain'd or inflamed; See Angina.

Glossagra:—Is a Rheumatism of ye Tongue and is a Species of Rheumatismus. Q. Vide.

Glossocoele:—Is a spasmodic, violent & sharp Extrusion of ye Tongue.

Glossocoma:—Is a spasmodic, violent & sharp Revulsion or hauling in of ye Tongue.

Gravido:—Cold in ye Head; Is a kindred Catarrh of ye Nostrils wt a painful uneasiness & heaviness of ye Head, hoarse Voice & difficult Breathing, Vid. Catarrhus, Frigus.

Cure: Thrust roots of ye Thin Yellow rind of an Orange up each Nostril, hold ye Head over Steam of hot Infusions.

Hiccup:—Seems to be a Convulsion of ye Oesophagus drawing ye Diaphragm upwards, whilst it is suddenly seized wt a convulsive Paroxysm & drawing downwards & proceed either from Repletion of Inanition. See Singultus.

Hoarseness:—See Catarrhus, Pertussis, &c.

Himantosis:—Is a greater Length or Slenderness of ye Palate yn usual wt Pain.

Hypostaphyle:—Is a Prolapse or Production of ye Palate wn it is either relax'd, inflamed, ulcerated, incrassated, attenuated or forked. V. Scorbutus. Blow Allum or Nitre on it. Wash Acid Elixir, Honey &c.

Iscnophonía:—Is a Fault of Pronunciation in wc one Syllable can't join another quickly. V. Psellimus.

Labium Leporinum:—Hare Lip. See Lagocheilos.

Lagocheilos:—Hare Lip. Is a Deformity in which ye Lip is divided by Chasms or Fissures. See Lab. Leporin. The Operation should be

omitted, untill ye Child has some Reason to suffer it to be done. On wc see Van Swieten, Sharp. It is pretty common for ye Roof of ye Mouth to admit of Reunion. Fissures of ye Palate often close in some years. Separate ye Lip from ye upper Jaw; divide ye Frenulum wc connects it to ye Gums. If ye Dentes Incisorii too much projected, cut ym out in Infants. Cut off ye callous Lips wt Scissors ye whole length, but take Care to make ye Wound in Straight Lines. Then bring ye two Lips of ye wound exactly together, & pass a couple of pins, one pretty near ye Top & ye other as near ye bottome, thro' middle of both edges of it, & secure ym in yt Situation by twisting a Piece of Wax'd thread, across & round ye pins 7 or 8 times. Then cut off ye points, lay a small Bolster of Plaster under ym, to prevent their Scratching. Wn only ye lower Part of ye Hare Lip can be brought into Contact, one Pin is Sufficient. The practice of bolstering ye Cheek upward does more injury to ye Patient, yn good to ye Wound. Dress superficially as often as is Necessary for Cleanliness. In 8 or 9 Days ye parts generally are found united, yn gently extract the Pins & apply dry Lint and Adhesive Plaster. This method may be useful in some Fistulae &c. Silver Pins & Steel Points suit ye Pomp of ye Great, but common Pins Answer ye End fully as well. See Cullen on Copper.

Lagostoma:—The Upper Lip divided. See Lagocheilos.

Leptophonia:—Is a fault of ye Voice which is very Weak. See Paraphonia.

Mumps:—Species of Angina. Q. Vid. Poulitis wt Wormwood & Vinegar. Give them Antimonial Essence freely. Avoid Greasy things internally & externally.

Mouth Sore:—See Scorbutus, Parotis, Parulis, Aphthae. Wash wt a Decoction of Hyssop, Sage, Oak Moss, mixt in honey & a little Allum. Horse Radish Root Juice & Honey. Purge wt Mullein Juice. Bathe the Head wt Rum, Glyster Saline, Tea of

Black courrants. Rhubarb in Soot Tea, Syrup of Mulberries &c.

Mutitas:—Is an Impotency in pronouncing Articulated or joined words. See Aphonia.

Nefrendis:—Is a Deformity in we ye Teeth is out of the Head.

Noma:—Is an Ulcer we does not consume & eat ye Afflicted Part alone, but all ye Neighboring Parts. See Cancer, Ulcus.

Odaxismus:—Is a pain of ye Gums yt Infants have whilst Teething. See Dentitis.

Oesophagismus:—Is a Spasm of ye Oesophagus we detains ye Food in ye Gullet after Swallowing it, attended wt great Pain. See Spasms.

Oxyphonia:—Is a shrill Voice, such as is commonly uttered in Wailing & Lamentation. See Paraphonia.

Ozaena:—Is a putrid Ulcer of ye Nostrils, from we a stinking Mucus distills. See Ulcus. Wn it is venereal, see Syphilis; if not, Tobacco Ointment or Honey of Roses wt a little red Precipitate; See Polypus.

Palate Diseased:—See Hypostophyle.

Palsy of ye Gullet:—See Oesophagismus.

Palsy of ye Mouth:—Gargle wt Sage Juice, purge well, chew, mustard.

Palsy of ye Tongue:—See Paraglossa.

Paraglossa:—A Swoln Tongue.

Paraphonia:—A Deprav'd sound of ye Voice. Remove the Cause if possible. Chew Ginger &c. See Aphonia. See Pr. Sauvages.

Parotis:—Is a Swelling of ye Parotid Gland (See Boils, Syphilis). Inflammation of Glands behind ye Ears after an imperfect Crisis. Suppurate wt Leeks & treat as Phlegmon, Q. Vide.

Parulis:—A Tubercle on ye Gums, giving much Pain, & of ye Inflammatory Kind. See Phlegmone.

Pertussis:—See Chin-Cough. The Whooping or Chin-Cough Is a Contagious Disease,

attended wt a convulsive & Suffocating Cough; a sonorous inspiration and Expiration; & oftentimes a Vomiting.

Cure:—Lobs Tincture 3 i bis vel ter die in Juice of Pennyroyal 3 ss, M. Purge once a Week. Mistletoe & Garlic, or Wild Onion Teas freely; Baum de Vie Pt. vij, Tinct. Canthar Pt. j. m. is also good; Glyster daily.

N. B.: After a Dose of Train Oil & Onion Juice ye Whoop no more.

N. B.: Our Epileptic Pills; Tar Water is good after it. Tea of Scots Thistle, Electar. of Sulph., Honey & Yolk of Egg, m.

Polypus of Ye Nose:—Is an Excrecence filling ye Cavity of one or both Nostrils, almost suffocating, or at least making Respiration difficult, arising from ye Laminae Sangiosae Membrane. There are several Species. Some resembling ye Hydattides of ye Liver, as in some Dropsies; Some like Ganglions of Nerves, we borrow their Coats from its Vessels. Those we are soft like Serum are form'd of Water, contained in Cysts; these are too tender to be extracted; but should be left to harden, we in time ye commonly do. If ye are Viscid, tho' ye cannot be drawn out at once by ye Roots yet at several attempts ye may be brought away in Bits. There is another sort neither so soft as to be squeezed to Pieces, nor so hard & brittle as to crumble, nor adhere to ye Membrane. This is ye favourable Kind, yt suits for Extraction by ye Forceps. But there is another Kind, & ye worst of all, we is hard & Scirrhus, adhearing so as to tear rather yn Separate, we often ends in a Cancer we See.

The Polypus sometimes grows large as to alter ye Bones of ye Face. When ye Polypus appears in ye Throat, Surgeon Sharp advises to extract it yt way because experience has taught, it is more easy to be Separated, wn pulled yt Way.

Operation on the Polypus. Let ye Patient lie Supine 2 or 3 hours to bring it fur-

ther down before ye Operation. Extract it by a Pair of Forceps, yt will take a good hold, introduc'd into ye Nostrils an inch & half, to make more sure of its roots. Then twisting ym a little from one Side to another, continue in yt action, while you pull away very gradually ye Body of ye Polypus. If it breake, you must repeat ye Extraction so long as any remains, unless attended with a Violent Hemorrhage; we often happens if ye Polypus is Schirrous. But be not Alarm'd ye Vessels presently collapse. Dry Lint, or Lint dipt in some Styptic will readily stop it. We prevent its future Growth by Vitriol in Toddy on Lint wn applied. The Cauteries & Setons of some are very good.

Psellimus:—Is a stammering in Speech, or a fault in pronouncing some Letters, Words, or Syllables.

Psellotis:—Is a Fault in Pronunciation, wn one Syllable or Letter is left out or taken away.

Quinsies or Sore Throat: See Angina. Are Various but always mean a Sense of Pain in ye Throat impeding in some Degree Swallowing or Breathing or both. The first Division is respecting Tumour. A Quinsy wtout Swelling is called Catarrhus Suffocativus by Some. Wn there is a Tumour it is again very various, Aqueous, Scirrhus, Inflammatory, Convulsive, Catarrhus, Oedematous, Purulent, Cancerous, & Gangrenous. All these must be treated differently according to ye Causes & Symptoms. See ye Original Diseases Inflammatio, Oedema, Cancer, &c. Wn inflammatory it is called Cynanche, ye Breath much interrupted, ye Voice much sharpen'd, ye Anxiety considerable &c. There is great danger Indeed & Death sometimes ensues in 8 hours or less.

For Cure: Bleed a large quantity immediately, apply Cupping Gourds or Glasses around ye Neck. Give a good purge immediately. Immediately blow Powder of Alum or Nitre on ye Palate, Larynx &c. & repeat as often as needful. It is a Remedy I have

used for some Years wt amazing Success & instances. Also take a Tea Cup of honey & as much Good Vinegar & 12 of boiling hot Sage or Alder or Rosemary Tea, & let him drink abundantly till he Sweats. Take

Crumb of Bread.....	3 iij
Sweat Oil or fresh Butter.....	3 i
Milk.....	q. s.

An Onion beaten, boil into a Poultis & apply hot to ye Throat & keep it hot. Wn ye inner Membrane of ye Larynx is inflamed, ye Danger is greater. Give 20 grains of Nitre in every hour in his Hydromel if he can Swallow. If a redness appear on ye Neck & Breast, ye patient oft recovers. Another sort of Quinsy, & much more common, is wn one of ye Tonsils grows red, & swelled, & painful, & ye Pain commonly extends to ye Ear on ye same Side. In a day or two ye Disease attacks ye Glands of ye other Side, ye first disappearing. These must be treated according to ye Pulse. And if ye Pulse be hard & quick Phlebotomy is necessary, & if ye Redness, Swelling of ye Throat, & difficulty of Breathing do not abate, bleed again; If ye Pulse be natural omit Bleeding; ye Hydromel, Nitre, Powder blown & Purges or Glysters, (wt Syrrup of Black Currants called a Specific) and Nitrous Decoctions &c are Sufficient.

N. If these Disorders are neglected too long, or ye inflammation is too great, yn Suppuration ensues, we is known if ye red Tumour last above 3 Days unabated. Then use emollient Gargles perpetually, wt Poultises, Glysters &c. In ye Cynanche & some Quinsies, to save life, Heister used safely to open one or more of ye Cartilaginous Rings, so that, even that is not dangerous. Only beware of ye Blood Vessels. Keep ye Canula in 'till ye inflammation cease. To know Wn stop ye orifice of ye Canula wt ye Finger, & if ye Patient can breathe easy, by ye Mouth, take out the Tube, & heal up ye Wound. Support wt nourishing

Glysters. Embrocate wt Volatile Liniments. Give Powder of Camphor & Nitre, Drink Hydromel, Gruel, Panada &c. (See Bronchotomy).

For ye Gangrenous Quinsy or putrid Sore Throat (V. Gangrena, Cancer, Typhus). Medicines not only Vegetable Acids, but Fossils too, as Spt. Sulph. Nitr., Spt. Vitriol, Spt. Sal Marine wt Honey of Red Rose &c. constringe ye Vessels & prevent ye too great Expansion, repel ye imperious particles, in ye larger Trunks & cure or prevent putrid Gangrines. Sydenham & Swieten used these as Gargles.

The Ancients used Alum, Flax, Oris, & Stercora of Animals. The Farmers of Zealand are fam'd for curing Quinsies by touching ye Uvula often wt White Vitriol, Sal. Ammoniac, & Crude Alom, to ye great relief of ye Patient. At first I puke wt White Vitriol gr. 25. Give Salts every day. I Keep up ye Vis Vitae. I would Gargle wt Strong Oose of Persimmon Root Bark, Honey & Alom. I give ye Bark a Teaspoonful every 2 hours wt Spt. Sal Amoniac 3 j in each Dose in Wine. I give Antimonial Wine 3 j thrice a Day. I have Mist. Sal. Tart. Guaiacum, Camphire, Nitre & Sal Amoniac āā 3 j in Spt. Vin. 3 iij often wt Success. Poultis wt Rue Jews Ears, Horehound & Lees.

Quinsy Malignant: Cynanche Maligna; Cullen. History or Description; It is Contagious; Seldom Sporadic, i.e. Endemic. Affecting few People in a Season. Commonly Epidemic, attacks all Ages & Constitutions, but more commonly ye Young & infantile & infirm. It first Shews itself in a Pyrexia, Cold Shiverings, Sickness, Anxiety, Vomiting, yn Stiffness of ye Neck, Uneasy Fauces, Hoarse Voice, ye internal Fauces of a dep red & some Tumour, Deglutition is seldom painful. White Ash Colour'd Spots wc Spread & Unite in thick Sloughs over ye Fauces; These falling off discover Ulcerations. A Coryza of thin Acid & foetid Matter attend; Infants

purge then, Acid, excoriating Stools. Pulse small, frequent, irregular, worst in ye Evening. Great Debility, Delirium & Coma. On ye Second Day, sometimes later, Efflorescences appear on ye Skin, patches of a red colour first on ye Face, yn over ye whole Skin, wt wc ye Fingers are stiff and swell. This usually continues 4 Days before Disquamation, but still ye Fever remains. Ulcers in ye Throat livid & black, breath foetid, Gangrenous Symptoms, Fever putrid, some die on ye 2d (?) Day, but more on ye Seventh; Putrification Continues along ye whole Alimentary Canal wt Diarrhoeas. Large Swellings of ye Lymphatic Glands of ye Neck, wc sometimes suffocate, Respiratory Organs hurt too. Wn ye Ulcers are more mild, ye Efflorescence disquimates after 3 or 4 Days. The Cure comes by gentle Sweats on or before ye Seventh Sleep & Appetite return &c.

Cures: Avoid Bleeding & Purges. Attend to Septic Tendency. Antiseptic Gargles, & Injections. Neutral Antiseptics as Cortex. Emetics both by Vomit & Nausea. Wn Tumours, Blisters, Flux, Essence, Throat Powder; Anasarcal Drink; Volatiles; See Cancer Poultises &c.

Scarify: Cup between the Shoulders & repeat it; Shun Antimon. Purges: Use gentle Emmollient Glysters; Blister ye Shoulders; Also round ye Throat. For ye putrescent Diathesis Cortex & Serpentaria; For ye Diarrhoea, Anodynes & Antihysterical Mixture. Throat Powder; Our Anasarcal Drinks. Bathe Neck wt Fucus & Rum, m., Haustus Cardiacus; Camphor & Volatiles. Apply ye White of an Egg & good Mustard & red Pepper to ye Pain of ye Throat. Pulv. Antispasmodic. Antiseptic Drops in ye Ears, also internally. Poultises of Lees & Rue from Ear to Ear.

N. B. A fatal Epidemic Cynanche was found by Prof. Monro & by ye New York Physicians to have a new membrane in ye larynx, of wc ye only cure was Mercurials &c.

Ranula:—Is an Encysted Tumour seated upon ye Frenum of ye Tongue, containing a thick tobaccous Matter.

Raucedo:—Hoarseness. Is a rough & obscure Voice, wc cannot be heard unless by those standing very near.

Cure:—Swallow slowly ye Juice of Horse Rhadish Root, Chew peruvian Bark & Ginger, Figs, Starch, Liquorice, Oily draught, Balsamics &c. Lohoch Pectorale;

R

Sperm. Citi. & White Soap. . . . āā 3 ij

The Yolk of an Egg, Ol. Lin. . . . 3 iss

Syr. Althae. 3 iii

M.S. Lohoch; rub ye Soles of ye Feet wt Hogs Lard before ye Fire. See Pectoralis.

Rencbus:—Is a Sound uttered thro' ye Nose. See Stertor.

Rhenopbonia:—A Speaking thro' ye Nose. Is a nasal Voice wc is not altogether uttered from ye Nostrils.

Rhachmos:—Is a sterterous Sound wtin ye Fauces. See Stertor.

Screatus:—Is Sonorous Evacuation of Mucus from ye Fauces.

Sternutatio:—Sneezing. Is a Convulsive Agitation of ye Membranes of ye Nose wt an impetuous Inspiration of Air, & presently making ye like Expulsion thro' ye Nostrils wt a Sound.

Suffocatio:—Is a Suppression of the Breathing or Respiration, from a continued contraction, or narrowness of ye Fauces or Trachea, wtout a Fever; a Symptom of Asthmas, Hysterics, Some Quinsies. Also See Dyspnoea, Orthopnoea, Ephialtes &c, &c.

Suffocatio Stridula:—A Disorder in Children called here & in Ireland ye Hives, in Scotland ye Croup, & in some Places Chock or Stuffing. In England ye rising of ye Light (See ye Pennsylvania Journal No. 1410). It seems to be a Species of Asthma attended wt very Violent Symptoms. The Infants are seized wt a Sudden & great Difficulty of Breathing, wc is soon Mortal unless relieved. It seems to be Nervous & Spasmodic. It is probable yt

may arise from a Phlegm or Mucous accumulated & hardend adhering to ye Trachea & Bronchia, like ye membrane discover'd by Dr. Monroe (& wc has been discovered here in a putrid contagious Quinsy, at New York, many Years since) difficulty seperable from ye Larynx. For Cure I would bathe ye Throat often wt ye Saponacious Balsam. Put his Feet in hot Water; if plethoric, bleed. Puke wt Antimonial Wine. Mix a little Camphire in Sweat Oil and add Honey, wt a few Drops of wc moisten ye Throat, removes ye Mucous Membrane and removing ye Spasm wt Lobb's Tincture, or a Grain of Opium, carefully dissolved in Soot Tea 3 viij by Spoonfuls till better. I would recommend Onion Tea, Saline Glysters, & a Plaster of Turpentine & Camphor between ye Shoulders.

Thrush:—See Aphthae, Purge wt Rhubarb. Glyster 2 a day, wash ye Mouth often wt Strong Tea of Sage, Hysop & Alder wt honey & Alom mixt. Melasses wt Juice of Horse Radish Root is good.

Tooth Ache:—See Odontalgia: Blow Tobacco Smoke in ye Ear of ye affected Side & put Oil of White Oak in ye Tooth made by burning ye twigs on a Cold Ax, or Pewter dish.

Tortura:—Is a bending of ye Mouth to one Side.

Traulotis:—Is a vitious Pronouncing of ye Letters S & R (See Blaesitos).

Chinese Cure:—R. Pomegranate Rind wt Pepper four Seeds beat & apply as Snuff. But if from Cold Blood, ye Smell to a Composition of Sal. Ammoniac & Lime Water tied up in a Rag. If from atrophy, ye drink Wine wt some Frankincense infused in it &c. Vomit, Cold Baths, Snuff ye Dew from Mallows Leaves. Drink a Decoction of Primrose. Wash ye Head wt a Decoction of Sage, Mustard Seed gr. 30 every Morning.

Vociferatio:—Is a painful & exalted Exclamation of ye Voice, to harden ye Body.

Uvula-Relaxed:—Blow in Alom, Nitre &c. Infusion of Mustard Seed. Decoction of Water Dock.

EAR.

Relatively little space is devoted to aural conditions. This is not surprising when we stop to realize that real interest in otology received its first great stimulus only about the middle of the last century through the work of Wilde, Kramer and others. An interesting side light may be found in the article on Otitis. The rules of Dr. Graham are given and commented upon with an underlying spirit of combativeness and antagonism. James Graham was perhaps one of the earliest ear quacks, in the true sense of the word, in America. He flourished in Philadelphia about 1773. Bass⁶ gives the following notice copied from the *New York Gazette*; and the *Weekly Mercury*, July 19, 1773: "Doctor Graham, Oculist and Aurist, is arrived in this City, from Philadelphia, and may be consulted at his apartments at Capt. Fenton's opposite Trinity Church, in the disorders of the Eye and its appendages; and in every species of deafness, hardness of hearing, ulcerations, noise in the Ears, etc. Persons born Deaf and Dumb, and those labouring under any impediment in their Speech, by applying personally, will probably be assisted. The Doctor intends to sail for England in a few months; those, therefore, who have occasion for assistance, must apply immediately."—His London career, with his Temple of Health, Celestial Bed and Elixir of Life, makes an interesting tale but like many other famous quacks his end was obscure.⁶

Otitis, The Ear-ach is, an inflammation of ye Ear. Otites, Diseases of ye Ear are internally & externally, especially ye former attended wt very Severe Pain, Head-ach & Alienations of Mind (See Delirium) a Loss of Sleep, & sometimes Convulsions &c. See Odontalgia. It occasions

great Restlessness & Anxiety, Pain, Redness, Heat & Fever, like other Inflammations (we see) proceeding from Suppression of Perspiration, exposing ye Head, to cold Water or Air wⁿ Sweating. Cure in this case must be by Bleeding ye Arm or Jugulars, Cupping the Neck, giving Antimonial Wine & Hydromel, Powder of Camphor & Nitre. Fomenting the Ear wt ye Steams of Warm Water Or applying ye Ear to a Jug filled wt a Decoction of Cedar Tops or Camomel &c.—Bathing ye Feet in Warm Water—And all around ye Ear wt Volatile Liniment &c. &c. If it cannot be dispersed yⁿ it will be best Suppurated by Juice of roasted Onions & a drop of Sweet Oil often applied in ye Ear.—If it break & run white & laudable Pus, wash it a little wⁿ needful wt Honey & Rum, & dress wt. Onion Juice & Honey mixt till well.

2. A Defluxion of an Acrimoneous humour, this has not ye great heat, burning & pulsation, but is painful from Irritation. See Opium. Blow tobacco Smoke thro an inverted Pipe into ye Ear we eases ye Pain. Then gently Syringe, wt a Decoction of wild Cherry Bark.—Mix Camphire in Sweat Oil & drop into it daily—or Syringe wt Warm Wine or drop Rosemary & Sage Juice in ye Ear often—Drink Barks & Guaiacum in Decoction.

3. Ear Ach from Worms, Wⁿ there is felt a sharp shooting Pain, a gnawing, & horrible Noise in ye Head, as wⁿ a Flea or any insect, has made its Way to ye Drum of ye Ear.—In this Case a Drop in ye Ear of Sweat Oil, or Brandy, or Juice of Wormwood, or even Warm Milk quickly destroys, or dislodges ye Insect, wⁿ it will come out on ye Cotten, or be cautiously extracted.

4. Ear Ach from Morbific Matter translated, as in ye Decline of Malignant Fevers & generally a favourable symptom, tho' it may cause Deafness. This may be eased by ye smoak of Tobacco, Camphorated Oil & Onion Juice.

5. Tinnitus Aurium, a tingling Noise in

in the Ears, often attends Nervous & Malignant Fevers & is also frequently a chronic Disorder, & very troublesome, & often ending in e(n)tire Deafness, we is seldom cured, & if relieved a while is apt to return again. See Phrenismus.

6. Deafness and Thickness of Hearing differ only in degrees. Sounds unless very loud make little impressions on them. This distressing Mallidy is seldom cured, because ye fine Organs of Hearing cannot be seen, nor their Disorders well ascertain'd, in living subjects & ye dead have no use for it. It is however sometimes occasioned by hard Wax in the Meatus Auditorius, & other pituitous Matter. This may be relieved by gently syringing the Ears with Warm Water.

If ye Tympanum &c be too tight Sweat Oil & Camphor, or Onion Juice in ye Ears on Cotten will have a good Effect, as I have often found. But if it be too lax & debilitated, washing ye Ear with strong Decoction of Wild Cherry Tree Bark, or black Alder Bark, or Wine wt sage & Rosemary stewed in it, may do good. Steams of Rue, Rosemary & Garlic, thro' a Funnel may be safely tried. Many have tried ye Fumes of Amber & Olibanum, & Spirit Sal Ammoniac, but it should be wt Caution. Some have applied Musk, Amber & Civit in a Dossil of lint in ye Ears, we seems rational to affect the sluggish Nerves—Some use Galls of Eels & Partridges & even Fumes of Sulphur, But the(se) appear to me improbable & dangerous.—Some commend ye Eggs of Ants in Onion Juice as almost infallible, but I have never ventured it. Some try Salivation by Mercurial Uction as the last probable Remedy.

Dr. Graham ye Otistis Rules by we He pretended to cure inveterate Deafness were these (1) Bleed the Jugular ̄ xij every 10 Days for three times.—(2) Three Emetic Boluses given one ye Day after each Bleeding.—(3) A Mixture Night & Morning (perhaps Tinctura Sacra & Amara mixt)

drinking Sage, Sasafras & Fennel Seeds Tea.—(4) His Accoustic Essence is each Ear & yn wt Force s(n)uffing it up ye Nostrils as long.—But Juice of Ground ivy, Rue, Rosemary & Garlic ̄ ii in hot Tar Water would be perhaps better.

(5) Then his Caephalic snuff we was no better yn Powder of ye Bark of Myrtle Root, or white Hellbore & Ginger, was often to be taken, yt ye must sneeze, keeping ye mouth shut, & ye Nostrils pressed together.—

(6) His Etherial Essence (not so good as camphorated Spirits) were applied to ye Ears & volatiles to ye nose for 5 minutes.

(7) His warm Drops for Deafness (perhaps Sweat Oil camphorated) 5 or 6 on Lint in each Ear.

(8) Pen(e)trating Spirits 3 i (Juice of Horse Rhadish Root is better) on ye Tongue applied to ye Palate & keeping ye Mouth shut long after.

(9) All these were done at night & repeated next morning, three times ye first Week & only twice a Week after.

(10) Twice a Week ye Legs & Feet were beathed wt warm Water. Semicupia of Decoction of Cedar Tops had been better.

(11) He embrocated the Head sometimes wt perhaps ye Volatile Liniment.—This was a Prescription for one born Deaf but by some mischance did not fully succeed tho' it made a considerable change. N.B. I once knew a Deafness cured by putting on Cotton some drops of a hot Pickle of Allom Salt applying it in ye Ear often.

Auditus:—See *Cophosis* & *Surditas*, & the Theory under *Otalgia*.

Cophosis:—A difficulty or Impotency of hearing or perceiving Sounds from some Impediment wtin or wtout the Labirinth of ye Ear. See *Surditas*. Try Camphorated Oil, Juice of Sage &c. Electricity has succeeded in Nervous Cases. Bleeding or Blistering in inflammatory. If Ulcers inject Tinct. of Myrrh & Honey. Insects, remove by Oil.

Buzzing in Ears: See Otaglia & Tinnitus Aurium.

Dullness of Hearing: See Cophosis.

Ears pain'd; See Otaglia, Surditas, Vermes.

Epiphlogisma:—Heat of some part, as if made by a burning Coal, attended wt pain. If in the Ear it is called Pyrosis.

Giddiness: See Vertigo.

Hearing (Dullness of): See Cophosis.

Hearing (Diseases of): See Otitis.

Nystagmus: is an involuntary Spasm of ye Eye or Lid.

Otoplatos: An Excretion of an ill-scented Humidity from behind ye Ears. This was one Year in Sussex, endemic & fatal among many Children, who had Agues & Fevers before. The Agues ceasing ye Children were swelled, bloated, Oedematious, & their Faces Cadaverous. Sores came behind ye Ears & several turn'd to Cancer & Gangrenes. At length we succeeded in curing it in ye same manner. See Cancer.

Otopuosis:—Is an Efflux of Pus from ye Ear, or a sordid Catarrh of ye Ear. See Otaglia.

Otorrhea: Is an Efflux of Blood from ye Ear. See Otaglia & Haemorrhagia.

Paracosis:—Is a difficulty of hearing articulated Voices, no Words distinctly. See Cophosis, Otaglia.

Surditas:—Surdity or Deafness: Is an abolished Hearing (See a Treatise under Otaglia). Drop a Strong infusion of Allom

Salt in ye Ear. Camphor dissolved in Sweat Oil. Some drop Juice of Ground Ivy.

Susurrus: Is ye perception of Sound not existing or a buzzing in the Ear & Disorder in ye Sensation of hearing. See Otaglia.

Tinnitus Aurium:—Tingling of ye Ears. See Otaglia. Put a clove of garlick dipt in Honey in ye Ear, alternately 8 or 10 nights.

Vertigo:—Is an Imagination in we all things appear to a man to be turned wt himself. See Epilopsia.

Chinese Cure. β . Pomegranate Rind wt Pepper, four Seeds, beat & apply as Snuff. But if from Cold Blood, ye Smell to a Composition of Sal Ammoniac & Lime Water tied up in a Rag. If from atrophy, ye drink Wine wt some Frankincense infused in it &c. Vomit, Cold Baths, Snuff ye Dew from Mallows Leaves. Drink a decoction of Primrose. Wash ye Head wt a Decoction of Sage. Mustard Seed gr. 30 every Morning.

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EDITORIAL

It hardly seems necessary to write a formal introductory note to a publication such as that of which the first number now appears. After much preliminary labor and discussion of plans, a number of those who are interested in the furtherance of the study of medical history in this country decided that the time was ripe for the undertaking. There is at present no periodical published in the English language devoted exclusively to medical historical literature, although at no time has more interest and assiduity been displayed in such studies. It is believed that the *Annals* will justify the expectations of those who have endeavored to put it forth. No effort will be spared to maintain it on the highest plane. It is hoped that it will furnish the medium of publication for the transactions of many of the societies which have been so active in recent years in historical work

in medicine, and that the material from those sources which has been heretofore scattered throughout various medical publications may thus be presented in a more suitable form. New books on the history of medicine will be reviewed, and a *department of notes and queries* will be established which should prove of great use. It remains to be seen whether the demands for the journal will be such as to justify its existence. It is hoped that those interested in the study of medical history in their country will realize the advantages offered by such a publication and give their active support to the *Annals* by contributing to its columns and by swelling the list of its subscribers. It will be noticed that no advertisements are published. This materially lessens the income from the publication but enhances its dignity. Let us add,—it also increases the necessity for a large subscription list.

THE LEGEND OF THE MANDRAGORA

Mandragora officinarum or mandrake, belongs to the order of Solanacea, and is one of the potato family. Its forked root is very thick and fleshy. By the ancients it was much used as a narcotic, especially during surgical operations. Its forked root, which somewhat resembles the forking of human legs, caused it to be esteemed, according to the doctrines of signatures, as an aphrodisiac, and it was one of the commonest ingredients of love philters. It was believed to utter shrieks and cries

when pulled from the earth, and that those who heard these cries were rendered insane. This is alluded to by Shakespeare when Juliet, pausing ere she drinks the sleeping potion in contemplation of the horrors of the vault, says:

Juliet What with loathsome smells
And shrieks like manrakes torn out
of the earth,
That living mortals hearing them run
mad.

Romeo and Juliet, Act IV, Sc. 3.

Furness¹ gives several instances in reference to this belief. "In Webster's 'Duchess of Malfy,' 1623: 'I have this night dug up a mandrake, and am grown mad with it.' Again, in the 'Atheist's Tragedy,' 1611: 'The cries of mandrakes never touch'd the ear With more sad horror.' In 'A Christian Turns Turk,' 1611: 'I'll rather give an ear to the black shrieks of Mandrakes.' In 'Aristippus or the Jovial Philosopher': 'This is the mandrake's voice that undoes me.' "

In order to avoid the danger of hearing its cries it was advised that to extract it from the earth, a string should be attached to the plant, and the other end tied to a dog. The latter was then made to run, dragging the plant up by its roots.

Furness gives the following quotation from Bulleine's "Bulwark of Defence against Sickness," 1575:

"Therefore they did tye some dogge or other lyving beast unto the roote thereof wyth a corde, and digged the earth in compasse round about, and in the mean tyme stopped their own ears for fear of the terrible shriek and cry of the Mandrack. In whych cry it doth not only dye itselfe, but the feare thereof kylleth the dogge or beast which pulleth it out of the earth."

J. F. Payne² has given a most interesting résumé of the *Herbarium Apuleii Platonici*, as translated into Anglo-Saxon in the eleventh or twelfth century. The Latin work of Apuleius (not the same as Apuleius who wrote the "Golden Ass"), was written about the fifth century, some think in Africa. It was evidently one of the "Leechdoms" or medieval textbooks most revered amongst the Anglo-Saxons and to it is probably largely due the popular dissemination of the fallacies about the mandragora

in the minds of the English people. The following is the description of the mandrake in the Anglo-Saxon version:

Mandragora (Mandrake. *Atropa Mandragora*).

'1. This wort, which is named *μανδραγόρας*, is great and illustrious of aspect, and it is beneficial. Thou shalt in this manner take it. When thou comest to it, then thou shalt recognize it by this, that it shineth at night altogether like a lamp. When first thou seest its head, then inscribe (Latin text surround)³ thou instantly with iron, lest it flee from thee; its virtue is so great and so famous that it will immediately flee from an unclean man when he cometh to it, hence, as we said before, do thou "inscribe" it with iron; and thou shalt delve about it so that thou touch it not with the iron, but thou shalt earnestly with an ivory staff delve the earth. And when thou seest its hands and feet, then tie thou it up. Then take the other end and tie it to a dog's neck, so that the hound be hungry; next cast meat before him so that he may not reach it, except he jerk up the wort with him. Of this wort it is said that it hath so great might, that whatsoever thing diggeth it up shall soon in the same manner be deceived, i.e. shall fall down dead.⁴ Therefore as soon as thou see that it be jerked up, and have possession of it, and wring the juice out of its leaves into a glass ampulla (or pitcher), and when need come upon thee that thou shouldst therewith help any man, then help thou him in this manner.

2. For headache, and in case that a man may not sleep, take the juice, smear the forehead; and the wort also in the same manner relieveth the headache; and also thou wonderest how quickly the sleep cometh.

4. For podagra, though it be very severe, with iron. The Latin word is *circumducere*, meaning to make a line around or outside it with iron.

⁴ In the Latin text the word *decipere*, which is evidently a mistake for *decidere*—fall down dead, die.

¹ Variorum Edition, "Romeo and Juliet."

² The Fitz-Patrick Lectures for 1903, "English Medicine in Anglo-Saxon Times," Oxford, 1904.

³ It is evident that the Anglo-Saxon translation was an error, since the herb was not to be touched

take of the right hand of this wort and also of the left, of either hand by three pennies' weight; reduce to dust; give to drink in wine for seven days; (the patient) will be healed, not only so that the swelling is allayed, but it also healeth the tugging of the sinews and wonderfully healeth both the evils.

5. For witlessness, that is, for devil-sickness (demoniacal possession), take from the body of the same wort mandragora by weight of three pennies, administer to drink in warm water, as he may find convenient; soon he will be healed.

7. If any one see some grave mischief in his house, let him take this wort mandragora, as much as he may then have, into the middle of the house; he banisheth all evils out of his house.⁵

Payne states that the Latin edition contains the following statements as to its anæsthetic properties which is omitted in the Anglo-Saxon version:

"If any one has to have a limb amputated, or burnt, or cut, let him drink an ounce and a half in wine, and he will sleep so long that the limb may be cut off without pain or feeling."

This direction is contained in the Latin edition printed by Philip de Lignamine about 1840, and Payne thinks it is perhaps the earliest notice in a Latin book of surgical anæsthesia, though the original observation came from Dioscorides.

Payne adds that John de Vigo speaks of its use for this purpose but says it is not without great danger. Dr. Payne's book contains a number of illustrations from the manuscript copies of Apuleins showing the method of pulling up the mandrake by attaching a dog to it by a string.

In his notes on Othello, Furness gives from Staunton the following quotation from Holland's "Pliny," Book XXV, chapter 13, "This herbe Mandragoras, some writers

⁵ This doubtless refers to evil spirits. A.-S.L. i. 1245.

call Circeium, and two kinds there be of it, the white which is supposed the male; and the black which you must take for the female. . . . It may be used safely enough for to procure sleep, if there be good regard had in the dose. . . . Also it is an ordinarie thing to drink it . . . before the cutting or cauterizing, pricking or lancing of any member to take away the sence and feeling of such extreme cures. And sufficient it is in some bodies to cast them into a sleep with the smel of Mandrage, against the time of such Chirurgery."

Gerard in his "Herbal" (1597) describes the mandrake as occurring in two distinct species, the male and female, in which mistake he probably followed Dioscorides.

Furness in his "Romeo and Juliet" gives from Halliwell the following quotation from the Works of Sir Thomas More, 1557:

"Whereas the Latine text hath here *somnia speculantes Mandragore*, I have translated it in Englishe, our minds all occupied wyth mad fantastickall dreames, because Mandragora is an herbe, as physicians saye, that causeth folke to slepe, and therein to have many mad fantastickall dreames."

Shakespeare refers to the groans of the mandragora in the second part of "Henry VI" when the Queen is talking to Suffolk.

Suffolk. "Would curses kill, as doth the mandrake's groan."—*Henry VI*, part II, Act III, Sc. 2.

The term mandrake was often applied in contempt of the physical appearance of a man. Thus Falstaff alluding to the diminutive stature of his page says,—

"Thou whoreson mandrake, thou are fitter to be worn in my cap than to wait at my heels."—*Henry IV*, Part II, Act I, Sc. 2, 17.

In allusion to the vicious propensities engendered by it and also having reference to the appearance of the root, Falstaff, speaking of Justice Shallow says:

"When a' was naked, he was for all the world, like a forked radish, with a

head fantastically carved upon it with a knife: a' was a forlorn, that his dimensions to any thick sight were invisible: a' was the very genius of famine; yet lecherous as a monkey, and the whores called him mandrake."

—*Henry IV*, Part II, Act III, Sc. 2, 333.

Bucknill⁶ directs attention to the fact that Shakespeare refers to the herb six times and that on the two occasions when its real medicinal properties are the occasion of its mention, the Latin term *mandragora* is used; the vulgar appellative, *mandrake*, being employed on the occasions where the vulgar superstitions are alluded to.

The use of *mandragora* as a somnifacient is referred to twice by Shakespeare.

In "*Anthony and Cleopatra*," the Queen bemoans the absence of Anthony.

Cleopatra. Charmian.

Charmian. Madam.

Cleopatra. Ha, ha! give me to drink *Mandragora*.

Charmian. Why, Madam?

Cleopatra. That I might sleep out this great gap of time. My Anthony is away.—*Anthony and Cleopatra*, Act I, Scene 5.

In "*Othello*" when Iago is hatching his foul plot we find the other reference, and with it an allusion to poppy (or opium) for the same purpose.

Iago. Look where he comes. Not poppy
nor *mandragora*,
Nor all the drowsy syrups of the
world

Shall ever medicine thee to that
sweet sleep

Which thou owd'st yesterday.

Othello, Act III, Scene 3.

When Archidamus is telling Camilla of the welcome that the Count of Bohemia will extend to that of Sicily when it shall pay its promised visit, he tells him that the Bohemians can hope to vie with the magnificence of the entertainment which the Sicilians have given them, but, he adds:

"We will give you sleepy drinks, that your senses, unintelligent of our insufficiency, may, though they cannot praise us, as little accuse us."—*The Winter's Tale*, Act I, Scene 2.

Sir Thomas Browne⁷ says that the idea that the root of the *mandragora* resembles a man "is a conceit not to be made out by ordinary inspection, or any other eyes, than such as, regarding the clouds, behold them in shapes conformable to pre-apprehensions." He states subsequently the opinion universally held at his time that there is really no distinction of sex in the vegetable world, consequently there could not be a male and female *mandragora* plant. As Wilkins points out in a note, the sexual differences in plants were not clearly defined, though suspected by Ray and others, until Linnæus published his "*Fundamenta et Philosophia Botanica*" in 1732, in which he clearly explained the difference in function of the stamens and pistils. He disregards altogether the traditional statements that the *mandragora* grew under gallows and places of execution, being there generated from drippings of fat and blood from the dead, and that it gave vent to a shriek when pulled from the earth.

⁶ "The Medical Knowledge of Shakespeare," page 218.

⁷ "Pseudodoxia Epidemica," Book II, Chapter VI.



BOOK REVIEWS

THE CURES OF THE DISEASED. IN FORRAINE ATTEMPTS OF THE ENGLISH NATION, London, 1598. Reproduced in facsimile, with introduction and Notes, by Charles Singer, Oxford, at the Clarendon Press, 1915. 50c.

This little book is a reprint of what is believed to be a unique copy of a pamphlet in the British Museum. In the preface Singer proves that its author, who has concealed his name by the use of the initials G. W., was George Whetstone, a singular literary genius who flourished in Elizabethan times. He also proves that it is the pamphlet referred to by Hakluyt as having been seen by him in manuscript form before publication. The work is intended as a guide to be used by Englishmen on their voyages, at that time so frequent, into tropical countries. The diseases of which the cure is considered are the calenture, or sunstroke, tabardilla, under which the author describes a very deadly fever which was probably yellow fever but may have been typhus, the espinlas, or prickly heat, cameras de sangre, or tropical dysentery, erysipelas, and scurvy.

The publication is of particular interest at this time when so much interest has been awakened in the study of tropical diseases.

PACKARD

POETRY AND THE DOCTORS. A Catalogue of Poetical Works Written by Physicians with Biographical Notes and an Essay on the Poetry of Certain Ancient Practitioners of Medicine. Illustrated with Translations from the Latin and by Reproductions of the Title Pages of the Rarer Works. By Charles L. Dana, A.M., M.D., LL.D., The Elm Tree Press, Woodstock, Vermont. \$5.00

All those who are interested in the literary side of the medical profession owe a debt of gratitude to Dr. Dana for the publication of these delightful browsings among his

books. The learned essay on some of the ancient poet-physicians by which the strictly bibliographical portion of the book is prefaced, not only displays the erudition of the author but also the poetic instinct which has guided him in his labors. In 1874 "Le Parnasse Médical Français" was compiled by Chereau. So far as the reviewer knows this is the only attempt at a complete collection of the medical poetry of any nation which has thus far been attempted, and Dr. Dana observes that it contains no really good poetry. It is to be hoped that if Dr. Dana carries out the plan at which he hints, of compiling an anthology of medically originated poetry, that its contents will be chosen with the discrimination of which we know he is capable, and that the plan of including every poem written by a physician, simply because its author was a medical man, will not be followed. Dr. Dana mentions so many physicians' names who have written poetry that was worth while, that there is no doubt that a large volume would be required to contain only selected portions of their writings. The great bulk of so-called poetry written by physicians can be cheerfully left in the limbo of forgotten things. Let us trust that Dr. Dana will carry out his project and give us a volume in which Anglo-Saxons may read with pride the real poetic achievements of such men as Holmes, Chivers, and Weir Mitchell not to mention the present poet laureate.

PACKARD

THE GROWTH OF MEDICINE. From the Earliest Times to About 1800. By Albert H. Buck, M. D.; Yale University Press, New Haven, 1917. \$5.00.

It is an ambitious undertaking to survey the growth of medicine in one comprehensive

treatise and naturally particular attention can be given only to the broader aspects and special details must be chosen with discretion. In this work there is the effort to give a general account of the development of our art in a form attractive to the general medical reader. The work does not go beyond the end of the eighteenth century.

There are three main parts, dealing with Ancient Medicine, Mediæval Medicine, and Medicine during the Renaissance. These are convenient divisions in the telling of the story and these periods of development are further divided into epochs. The author laments, and those of us who are interested in medical history join with him in this, the lack of knowledge of medical history. It is of interest to speculate how much we of this generation owe to the workers in each of these periods. When we follow the course of the stream of medical knowledge through its many wanderings the wonder is that the continuity endured in spite of the many things which tended to check it. Ask senior students or many practitioners how much they owe to Arabian Medicine and the majority would not even understand the question. A query as to our debt to Greek Medicine would perhaps be illuminated only by a knowledge of the fact that Hippocrates once lived. Quote to them the saying that "Except the blind forces of Nature, nothing moves in this world which is not Greek in its origin," and a polite incredulity would be the probable result. For such this work should be particularly useful, especially as the author has endeavored to trace reasons in addition to giving facts.

To many the past is a sealed book, the sources of knowledge have no interest for them and while they may not think that knowledge will die with them, yet they consider that its birth and their own coincide very closely. This has been termed "an inept derision and neglect of the ancients" from which we may be delivered by some knowledge of history. Such knowledge may

even be of practical value as in an instance in which a physician considered that he had made a significant discovery which he was eager to give to the world. A friend pointed out to him that he had been forestalled by Celsus nineteen hundred years ago.

This work opens with a short discussion of the beginnings of medicine and then takes up the subject of Oriental Medicine in which with much superstition there was a surprisingly large amount of sense. For the account of Grecian Medicine there is more material available and naturally Hippocrates claims considerable attention. These sections give an excellent summary of the state of medicine in Greece and explain its association with the schools of Alexandria and of Rome. Much interest belongs to the formation of the various sects and the reasons for their development are set out. Greek learning was carried far and wide and the story shifts from Greece to Alexandria and then to Rome where Galen stood pre-eminent as the figure destined to dominate medical thought for many centuries. The introduction of Grecian medicine to Rome and the authoritative position so long occupied by Galen had a tremendous influence on medical thought.

The second part deals with Mediæval medicine and gives a clear account of the Arab Renaissance, perhaps one of the most surprising periods in the history of medicine. The author gives us explanations as to why many of the changes came about and these are fully as interesting as the historical facts themselves. The School at Salerno comes in as a connecting link with the development in Europe during the Renaissance. In the account of this period we find names which are more familiar and the course of progress can be given more in detail. The account of the development of surgery in the various countries of Europe occupies considerable space and is complete. Dr. Buck takes the view that the use of Latin in medical publications was a hindrance to development. It

hampered medicine more than surgery, for the physician using Latin was saturated with a reverence for authority, mostly in the person of Galen, while the surgeon trusted more to his own observation. This may have been in the mind of Sydenham when he gave his celebrated advice (as the somewhat doubtful story goes) as to the best reading in the study of medicine.

There are many points which might be discussed if space permitted. The author must have had difficulty in choosing his material; there is so much of interest and side paths constantly attract. But he has kept well to the straight road. He refers to the incident of St. Paul being bitten by a viper without hurt. It must have been a temptation to discuss the nature of the Apostle's "thorn in the flesh." The work can be highly commended for its interest and style and as an excellent contribution to the study of medical history. It is more for the beginner than for the veteran student and this does not imply any criticism—much the contrary. The book is well printed in clear type and has a number of excellent illustrations. It is published by the Yale University Press on the Williams Memorial Publication Fund.

McCRAE.

ANATOMICAL NAMES, ESPECIALLY THE BASLE NOMINA ANATOMICA ("BNA"). By Albert Chauncey Eycleshymer, B.S., Ph.D., M.D. Head of Department of Anatomy, University of Illinois, assisted by Daniel Martin Schoemaker, B.S., M.D., Prof. of Anatomy, St. Louis University, with Biographical Sketches by Roy Lee Moodie, A.B., Ph.D., Assistant Professor of Anatomy, University of Illinois. William Wood & Co., N. Y., 1917.

No greater boon could be conferred on the American student of anatomy than the publication of this most excellent work on anatomical nomenclature, wherein the so-called Basle Nomina Anatomica ("BNA"), the now universally recognized standardization of the scientific names for the structures and organs of the body is fully put

forth and its use explained. A very excellent preface describes the necessity which had arisen for the development of some uniform system of nomenclature, and the steps by which it was developed. Vesalius complained in his time of the disorder in the study of anatomy which resulted from the great number of existing terms, and that many different names were used by the various authors to designate a given structure. A rapid sketch is given of the evolution of the terms in ordinary use by anatomists, and the confusion caused by lack of method and uniformity is well illustrated. Thus approximately fifty different names were given to the corpus pineale, before the latter cognomen was definitely assigned to it in the BNA. The difficulties encountered by the German Anatomic Society from the time when it first took up its labors in 1887 until they were terminated at the meeting of Basle in 1895 were tremendous. The Preface is followed by a translation of the article by Wilhelm His giving an account of the methods pursued by the Committee and recounting some of its chief troubles, such as the question of the application of personal names to anatomical structures, on which His confesses he leaned strongly towards the retention of many, and which was met by a compromise, giving objective names to every part but where personal names were very widely used, adding them in brackets. Another important point was the consideration of the anatomy of the various specialties. The work was finally accomplished in a manner which, as with all human endeavor, has found critics, but yet is satisfactory to the great body of the profession.

The book is accompanied by a series of biographical sketches of the anatomists of the world with bibliographical addenda of great value. It concludes with one of the best compiled indexes that it has ever been the pleasure of the present reviewer to go through.

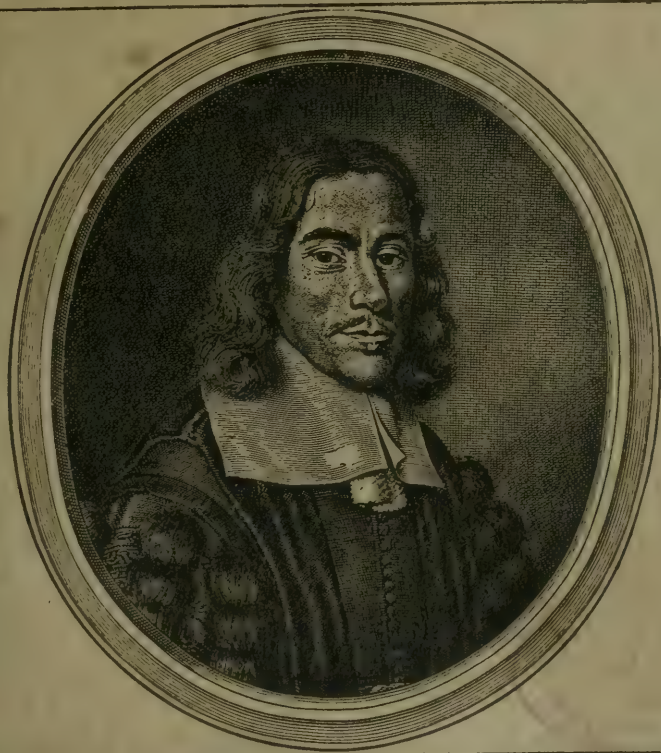
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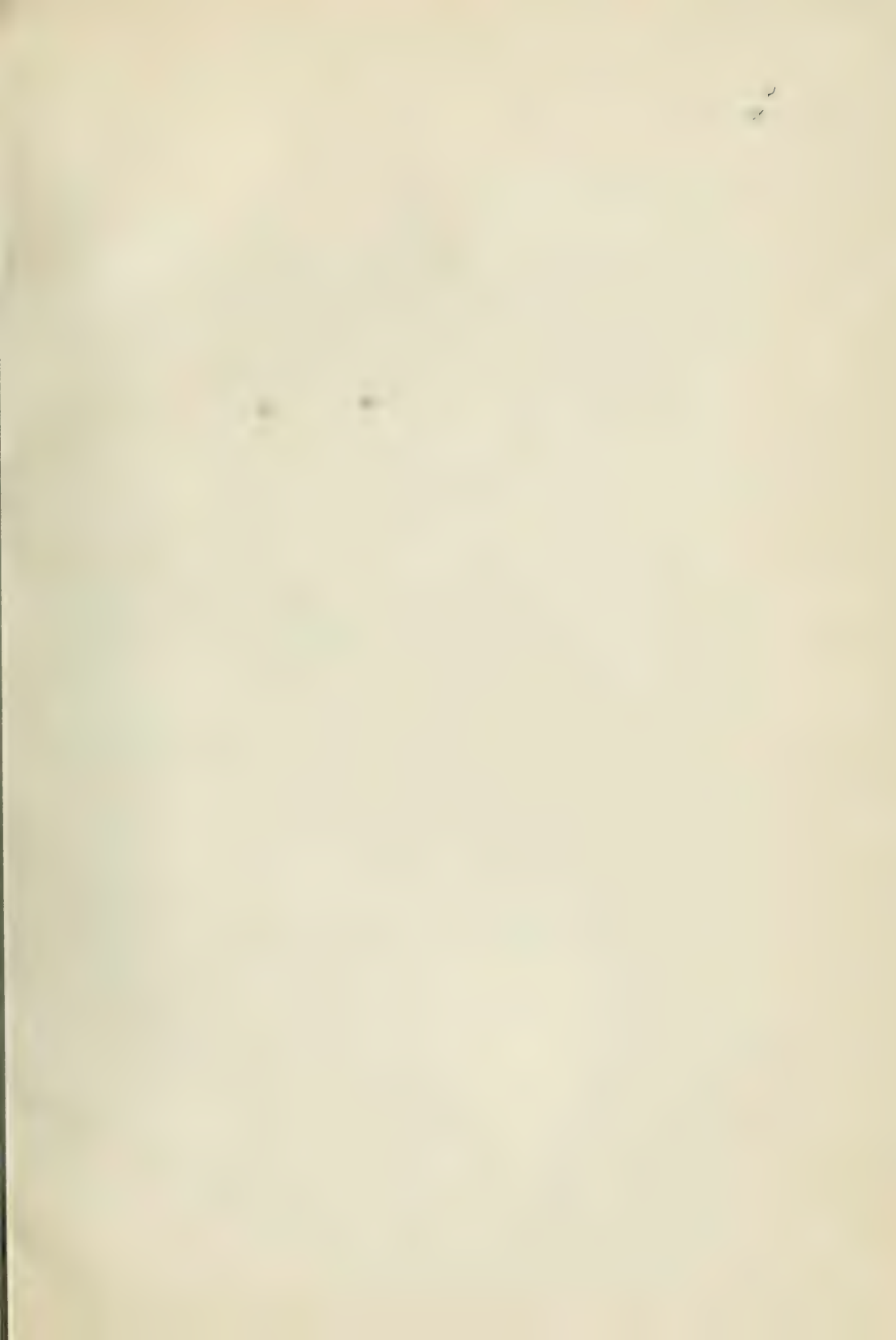
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JOHN SHAW BILLINGS
(1838-1913)

ANNALS OF MEDICAL HISTORY



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EULOGY OF DR. JOHN SHAW BILLINGS

READ BY DR. ABRAHAM JACOBI AT THE MEMORIAL MEETING OF THE NEW YORK
ACADEMY OF MEDICINE, 1913



THE death of Dr. John Shaw Billings has robbed America of one of its greatest men. This New York Academy of Medicine, the representative and headquarters of medical endeavor in New York, is anxious and eager to honor itself by extolling a man who was so prominent in many fields of knowledge, research, and activities that each of them would have secured his immortality both in medical and general history. Indeed it is mostly to mere specialistic learning and labor that many of our famous men owe their deserved renown.

Dr. Billings began his life as a demonstrator of anatomy in a western college. In the Civil War he served the country as a surgeon, and finally as a medical inspector of the Army of the Potomac. He then set out to develop the scanty library of the Surgeon General's Office established by

Wm. A. Hammond. A few years of hard work on the part of Billings and the liberality of Congress made the library grow so that in 1876 the plan of publishing the Index Catalogue was matured and in 1880 the first volume was printed. Of this monumental work which amazed the world there are now thirty-five¹ volumes. The same fertile genius created the Index Medicus, which was continued by Fletcher.

His military labors developed in him an inexhaustible interest in public health and in hospital organization. He was the adviser and builder of the Johns Hopkins and other hospitals. He delivered courses on the history of medicine in Johns Hopkins University, was professor of hygiene in the University of Pennsylvania and director of its new laboratory of hygiene. In 1896 he became the director of the New York Public Library. Some weeks ago he left behind him two millions of books and fifty branch libraries. For two editions of the U. S. Cen-

¹ The completion of the second series makes the total now thirty-seven volumes.

sus he was the statistician. Of the Carnegie Institution of Washington he was the chairman.

His erudition was stupendous, not only in medicine, but in history and the literatures of the world. His vast reading and retentive memory carried him into all continents and zones, into sciences and trades, into chemistry, physics and meteorology.

Such was the commanding genius with the measured tones, the pleasant voice, the humorous remarks, the interest in all that is human, in social problems, and economic and political questions. Withal he was governed by unfailing modesty and a cheerful readiness for self extinction. In his disinterestedness he did not so much as think of complaining, when the inauguration, two years ago, of his very creation, the Library, was not even to be graced by his ever thoughtful and forceful eloquence.

The multiplicity of his virtues, aims and results cannot be expressed in a few sentences. We trust, however, that it is not probable that the light-heartedness and forgetfulness of an ungrateful republic will deal with his memory as with that of lesser men. It is in him that the combination of American idealism and creative constructiveness is best represented, an example to be emulated by all men, both great and small, in all countries. Though Billings was rarely active in this hall, his perfection is known to us and will be appreciated forever. His very life, ever vigorous, ever modest, ever bountiful, is his eulogy. There is nobody here who is not impoverished by the loss of his efficiency and influence. To those who were personally near to him, to the members of his immediate family, it is for us a sad and honorable duty to express our mournful sympathy.

Τὴν ὧθι Σεαυτὸν

What am I? How produced? And for what end?
 Whence drew I being? To what period tend?
 Am I th' abandoned orphan of blind chance,
 Dropt by wild atoms in disordered dance?
 Or from an endless chain of causes wrought?
 And of unthinking substance Born with thought.
 The purple stream, that through my vessels glides,
 Dull and unconscious Flows like common tides.
 The pipes through which the circling juices stray
 Are not that thinking I, no more than they.
 This Frame compacted with transcendent skill
 Of moving joys obedient to my will,
 Nurs'd from the fruitful Glebe, like yonder Tree,
 Waxes and wastes, 'tis mine but 'tis not me.
 New matter still my mouldering Mass sustains
 The Fabrick chang'd, the Tenant still remains.

John Arbuthnot (1675-1743-5).

THE HYGIENIC IDEA AND ITS MANIFESTATIONS IN WORLD HISTORY¹

By PROFESSOR KARL SUDHOFF

UNIVERSITY OF LEIPZIG

Translated by DR. FRANK J. STOCKMAN

LIBRARY OF THE SURGEON GENERAL'S OFFICE, WASHINGTON, D. C.

OLD familiar childhood recollections and beautifully contrived poetic fantasies of ancient and modern impress flatter us with the notion that, at least in the field of hygiene (as was seriously taught, centuries ago, of many phases of human knowledge), the acme of enlightenment and achievement was already attained in man's earliest infancy; that, in this science, at least, the beginning of wisdom was synchronous with the genesis of things in general.

Such teachings haunted the science of chemistry for the longest period. As late as the seventeenth century, it was assumed that Tubal-Cain was her greatest master, and that wise Solomon, while building his temple, knew more of the mysteries of chemistry than possibly the great Geber, Paracelsus, Basilius-Thölde² and Andreas Libavius together.

This false idea, as being self-contradictory, eventually annihilated itself. But numberless ages ago, our ancestors along the Baltic Sea and the Bay of Biscay, or on the Highlands of Pamir, the residents along the Euphrates or the Nile, are still supposed to have imparted the most important lessons in hygiene, in healthy living and immunity from disease. Even today, some assume that this is incontrovertible and self-evident. A well informed man will hardly venture to offer valid ob-

jection to that old and oft-quoted catchphrase anent the "life comfortable to nature." In fact, it would be possible to devote a whole volume to an account of the many times that the cry "Back to Nature" has resounded in its innumerable variations; well nigh every possible view of the universe and a stately array of marvelous philosophizing would necessarily be presented; a lengthy jeweled chain of brilliant names in the history of human thought would pass in review.

I shall not commit the heresy of denying each and every justification of this cry, even though there is more beating of the air on this point than is commonly surmised. I shall be content with demonstrating that the paradisiacal condition of a long life, free from care, with a late unencumbered old age, was by no means the rule in prehistoric and ancient times. It is true that, as compared with the present, those times could boast of superiority in some, but by no means in all respects. Upon inspecting the many early Egyptian and Nubian crania, for instance, we are astounded at the perfect preservation of the teeth, although the extensive abrasion of the masticatory surfaces is rather startling, suggesting simple, suitable fare, but mainly of vegetable character, rich in cellulose and with a generous adulteration of sand particles. We become rather thoughtful, however, on finding in the majority of adult skeletons from Upper Egypt and Nubia of five to seven thousand years ago,

¹ *Deutsche Revue*, Stuttgart, 1911, iv, 40-50.

² Sudhoff is of opinion that the writings of Basil Valentine are the work of the editor, Johann Thölde.

signs of a disease which to-day appears only under the most unhygienic conditions, and then hardly to such degree as it formerly affected a tremendous majority, even in the third decade of life, causing ankylosis of the joints and spine with almost absolute immobility, so that at an early age these unfortunate people became helpless dependents. Osteoarthritis deformans in that "Golden Age" afflicted humanity of both sexes with such frequency and severity as to stagger all power of imagination in this our own period, so corrupt with "refined culture", on the one hand and misery on the other. Even then, constant sojourn along, upon and in the waters, even more perhaps the dwelling and sleeping upon the damp ground, in wet pits and caves, was a fruitful source of disease.

I have purposely begun with an account of conditions in the subtropics, where for a long time the cradle of mankind lay beneath the palm trees. Yet, the hygienic coefficient of life among the early inhabitants of Northern Europe, derived from a study of osseous remains, differs but slightly from the results of investigation along the Nile. Less attention has been paid to pathological findings in the archaeological researches north of the Alps, thus restricting the material to more modest proportions; but such osseous remains as have been carefully studied exhibit exactly the same tendency. Rudolph Virchow's "cave gout" in man and beast has long since been incorporated in historic pathology; the primitive Germans, who interred their heroes in the long stone passages of the "giant chambers," suffered to an appalling degree (almost ninety per cent of adults) from gouty diseases of the bones and joints. Dietetic customs along the Nile and the Baltic Sea were certainly the most diverse, but, in the manner of abode, perfect parallelism existed in one respect, namely that of dampness: whether the habitation were a lake dwelling over the placid water, or a rustic

hovel, depressed below the surface of the ground to the depth of a meter, only gradually (at least in the case of sleeping quarters), emerging from the pits which from the Stone Age to La-Tène constantly became more and more shallow. A moderate advance, perhaps, but highly important!

Although climate may exert only a minor influence upon the character of habitation, this is not true in the matter of clothing. Enthusiastic as we may be about the light, hygienic clothing of the Egyptians, Babylonians, or even of the Greeks, we must nevertheless properly evaluate the wisdom of the North Alpine people, whose men were clothed in warm trousers and waist-coat, their women in long skirt and jacket. Perhaps the Greeks migrated from the North in similar garb, and, in a warmer climate and under altered conditions, learned to know and prize the light, convenient, Mediterranean or subtropic costume of cloth simply thrown about the body—a warning against premature generalizations about clothing problems for all climates, even when we exclude those of the polar regions!

Viewed in the light of hygiene alone, classical antiquity, Greece and Rome, represents a cultural pinnacle of almost incomparable height.

The Greeks, a master people (with a substratum of slaves), for the first time in history, and in a scope and degree never again approached, undertook universal training of boys (in some phratries, of girls also), with a view to the harmonious development of all the physical faculties and to the attainment of the greatest measure of strength, dexterity and self-confidence, of physical perfection and beauty. The system was founded upon daily exercise from earliest youth to ripe manhood, under the supervision of experienced and practised leaders, who not only strove to make it viable and successful, but were capable of intelligent specialization, ex-

acting from each physical entity the highest possible accomplishment, with constant reference to general vigor. The teacher of gymnastics became the professional "gymnast," who strove to comprehend the normal functions of the body, vying with the medical fraternity, who again studied the value of gymnastics for a healthy physique and took from its storehouse of anatomic-physiologic knowledge the plumb line for estimating the possibilities of each individual. With the aid of general dietetics, the physicians deduced the norms for the application of gymnastics to the prevention of bodily ills and as an auxiliary in the treatment of general or organic disorders. Under this beneficent rivalry between professional gymnast and physician, gymnastics itself became a scientific system of physical exercise and invigoration, of hygiene of movement and occupation, such as we to-day, with the aid of modern technique and instrumental precision, are intent upon creating anew.

With this central endeavor of Hellenism, physical invigoration by daily gymnastic exercise, the rest of personal hygiene was in great measure associated, viz., care of the skin by washing and bathing, by swimming and massage; physical cleanliness, including care of the hair and clothing; as well as regulation of diet, rest and sleep, and of the sexual life. The regulation of the latter function in the gymnastic exercises of girls was divorced from prudery and had a definite eugenic aim: vigorous offspring.

The public officers of Greece were engrossed with other questions of hygienic importance. Town planning, arrangement of streets, sunning of houses, sewage disposal and water supply were carefully considered and purposefully regulated, especially in the culminating cultural period of the Age of Tyrants. The Romans, among whom solicitude for the purity of grain and potable water was recognized almost as a

religious and state duty, with their eminent talent for solving great questions, contributed much to public hygiene. In the days of their world empire, water supply, drainage, road-building, town-planning, food-control, heating, and baths were regulated with a thoroughness which evokes our respectful admiration even to-day. In the cult of Vesta and Juturna, the Roman early evinced an inherent sense of the fundamental necessity for purity of food, which can proudly take its place beside the justly extolled cult of food-hygiene of the Orient. We shall deal with the latter immediately; for Græco-Roman antiquity, we must again repeat that, although hygienic requirements were partly based on cult-hygiene, these peoples soon outgrew this purposeless infancy and set themselves conscious hygienic goals, devoted themselves to their attainment in a large genial manner, and accomplished results which, in addition to constituting a scientific supervision of the life of the individual, will forever merit admiration as the first attempt (conceived and executed with genius) at personal and public hygiene with definite aims: indirect prophylaxis by increasing the vigor and resistance of two whole nations.

On the other hand, what is the significance of the extolled cult-hygiene of the Egyptians, Babylonians, and even of the Jews, who never conceived of hygiene directly and with intention, the subject appearing in pre-Hellenic times as something incidental or as an almost negligible side-issue? Modern historic research does not support the legend of a Moses leading his people with deepest wisdom and confident, purposeful clarity over the road of hygiene in religious garb, thousands of years ago; the theory is as far removed from truth, perhaps, as the assumption of a perfect natural hygienic condition of mankind at the start. The hygienic contributions of the Western Asiatics (especially of the Semites) to humanity are enormous, but

they lie in a totally different sphere, as we shall perceive.

A few preliminary words on the negative side. It is no longer correct to regard the ritual hygiene of Judaism as a singular phenomenon, as in former days, when it constituted the only remaining specimen of an entire cultural cycle, buried under the ruins of centuries, from which it has only just been unearthed with many elucidating disclosures. In the midst of the tides of racial intercourse flowing and ebbing from the Euphrates to the Nile, we can imagine the Jewish people exposed to cultural currents from which it adopted and adapted much. What are to-day considered fixtures of ancient Semitic culture, originated almost exclusively after the exodus, partly, therefore, after the time during which the people of Israel had been exposed for decades to the influence of racially and intellectually kindred civilizations along the Euphrates and the Tigris. To trace externalities of custom to their origins is consequently difficult. In the period especially represented by the compilation of the Talmud, the Jews had for centuries been influenced in hygienic matters by Greek science, from which they assimilated and amplified whatever seemed suitable for adoption. In estimating and evaluating the hygiene of the Jews this fact should be borne in mind, without in the least detracting from their merits; claims to special originality alone are thereby given a new aspect.

Among all peoples of antiquity, meat diet was, so far as the domestic animals are concerned, a sacrificial cult in the first instance; everywhere, on the Jordan, Tiber and Cephissus a sacrificial inspection was combined with this, which exhausted itself mostly in sophisms, but also (particularly in Mesopotamia) contributed a fund of experience which prepared the way for a sanitary meat-inspection, and imparted a viable, interpretative basis to future hy-

gienic knowledge. The same is true of cult cleanliness which, as has already been shown, was not less developed among the Greeks than among the Orientals along the Euphrates, Jordan and Nile, upon whom (including the Jews), the Grecian amplification of an intentional personal hygiene exerted undoubted influence. Even ritual uncleanness of woman under special circumstances, is ancient property of Greece. Pope Gregory the Great, in eliminating this Jewish atavism from Christian custom, performed a liberal and noble service to womanhood, by leaving the question of church attendance during menstruation and puerperium to the free decision of the individual, thereby effectively removing the whole matter from "cult-hygiene"—a landmark in the emancipation of woman from unwarranted guardianship, which cannot be commended too highly. But to return from this digression!

There is no longer any doubt that the Jews borrowed circumcision of males from Egypt, while the origin of the custom for both sexes is traceable to Central Africa. The fact that the custom bears no subjective hygienic impress does not deprive it of objective hygienic value, any more than in the case of other customs originating in entirely different spheres of thought. But the hygienic importance of circumcision of males is minimized by the proof of the non-existence of syphilis in the Old World in pre-Columbian times, as is to-day generally assumed. To cite congenital anomalies (e.g., phimosis) as an argument for general circumcision removes the whole question to another sphere. Clitorotomy, of identical religious origin, has to date not been proclaimed a hygienic measure. That Judaism did not adopt this ritual custom of the Egyptians is explained by the fact that, in the temple cult of the Jews, women originally played no role, in fact, were forbidden entry to the temple. The question here arises, whether at some period in the his-

tory of Israel, only the priestly tribe was circumcised, or whether from the beginning, circumcision characterized the whole people as sacerdotal.

But let me not be misunderstood! In the history of hygiene, as well as in the history of general culture, these questions of cult-hygiene are of transcendent interest. None, however, is to be considered a landmark equivalent to the gymnastics of the Greeks, the hygienic vision of Hellenism and the achievements in public sanitation of the Romans. Two of the greatest hygienic thoughts of mankind owe their origin to Semitism, especially to her intellectual prime (Judaism being the bearer, intermediary and perfecter): the weekly day of rest and the direct prophylaxis of disease.

The first will be immediately evident to all, even though it has not yet been clearly recognized and proclaimed as a hygienic manifestation of prime importance. Babylonian civilization probably had a precursor of the Jewish Sabbath. In Babylonian astrology, the 7th, 14th, 21st, and 28th days were ill-starred; to these was added the 49th (7×7), counted from the beginning of the preceding month. No foods could be baked or roasted (nor those prepared in this manner ingested); change of clothing, sacrifices, public acts, and medical treatment were interdicted; in fact these days were inauspicious for the execution of any project. Through these numerous inhibitions, the "unlucky" day became, in part, a public day of rest—in part only—and it might seem that from this emanated the suggestion of the Jewish Sabbath. But nevertheless, what a wealth of physical and spiritual blessing was poured upon the Jews by this, their holy day, their day of rest! More than any other factor, it gave them strength to assert themselves among other races; and by contributing this hallowed day to Christianity and Islam, they thus imparted its hygienic blessing upon the greater part of the world.

Had Judaism given nothing more to mankind than the establishment of a weekly day of rest, we should still be forced to proclaim her one of the greatest benefactors of humanity.

What can be said as to the second thought, direct prophylaxis?

Although Greek medicine became of incomparable importance in general human progress and bases its title to fame chiefly upon the substitution of the investigation of natural etiology for the supernatural demonic medicine, which ruled the whole of pre-Hippocratic Orient and Occident (Mediterranean and North Alpine) and still enslaves part of the world, it is a most interesting fact that, despite its theory of natural causation, Greek medicine was blind to the fact of contagion, of direct transmission of disease. Whence so glaring a defect in the face of such keen perception of the processes of nature? Thucydides' history of the Athenian plague shows that these facts had not entirely escaped the Greeks, but Greek medicine passed them by, perhaps, because a natural explanation seemed impossible, since the populace so readily satisfied itself with the "Evil Eye" and similar imaginations.

Along the Euphrates, however, we come early upon the concept of a chronic, rarely curable disease, characterized by cutaneous changes and capable of transmission to others. Babylonian culture in fact readily drew the proper conclusion and translated knowledge into action: Those affected with this disease must be debarred from intercourse with the healthy. Whoever was defiled by *iššubbu* (leprosy) was banished to the wilderness. Details regarding these matters are still wanting in original sources, no matter how often the facts transpire through the Assyro-Babylonian tradition. But in the Old Testament, we have a methodic inspection of a leper by the priest, who, according to the diagnosis, isolated the patient temporarily or per-

manently, and admitted him again to free intercourse only after indubitable convalescence or cure. To be sure, it has never been determined (because indeterminate), whether the *zaraath* of the third book of Moses represents leprosy exclusively; to see in it a harmless disease, however, degrades a serious, austere procedure of one of the most outstanding legal codes in history to a silly farce. Any competent, unprejudiced investigation must lead to one conclusion, viz., that the majority of those suffering from the symptoms enumerated in Leviticus xiii were lepers; the most important point historically is the fact that the Mosaic Law gave to mankind the idea of the imperative necessity of isolating those afflicted with a chronic contagious disease; in addition, the purification measures recommended in Leviticus for infected houses constitute the armament of modern prevention of epidemic diseases. In this connection, it makes little difference to me if the so-called *zaraath* of houses had no relation to leprosy, and that modern prophylaxis is not derived directly from Leviticus. (It is neither evident nor probable that the place of refuge of the leper King Azariah-Uzziah represents a leprosorium in the mediæval sense.) The fact remains, however, that the whole concept of the transmission of serious disease by social intercourse with the afflicted, and of the consequent isolation of the diseased became property of the West by religious route.

When leprosy fell upon the ancient world from the East, and came to the cognizance of Greek physicians, especially of Alexandria, these met its appearance with an admirable establishment of the semeiology, without penetrating deeper into epidemiological questions or recording prophylactic segregation measures. Egypt, where in Hellenic times leprosy spread and became established, was then its principal sally-port in the West and is, even to-day, one of its most intensive fields of activity. From

Egypt, the disease in sluggish epidemic form traversed North Africa, crossed the straits of Gibraltar with the continuous stream of travelers, and spread over Moorish Spain; at the same time the germs were carried by the constant migrations across the Mediterranean to Italy and Southern France, across Byzantium to the Balkan and Danube states. The network became especially close over Southern Gaul, and even further into Celtic domain, over which a Germanic stratum had been deposited; here, authentically in the sixth century, the thought of rending or cutting the threads of the epidemic which coursed over the lands was initially entertained. Enlightened princes of the Church, moved by the increasing misery of the people, on the strength of the sacerdotal code of the Old Testament, undertook the task of interfering; the shepherdess of the mediæval peoples knew her duty. The Council of Lyons (583) attempted to restrict the free migration of lepers! The edict of Rotharus, King of the Lombards, demonstrates what advances this idea made in sixty years; the acts of Charlemagne, one and a half centuries later, show the same trend; the leprosy decretals of the third Lateran Council (1179) represent, in a measure, the last word of the Church. Apprehension of lepers became general routine in the territories of the ecclesiastical and secular princes of France and Germany; isolation camps were established everywhere, gradually increasing to thousands. Thither the lepers and suspects were taken, the former civilly dead for the rest of life. This system was mercilessly enforced for centuries with perfect success. In this tenacious fight of centuries, the methods of which were borrowed from the Mosaic Code, the Occident triumphed over leprosy. Guided by this intellectual torch, it accomplished the first great feat in direct prophylaxis: methodical eradication of leprosy by consistently making the affected individuals harmless

as carriers of the virus. Light from the East is transformed to pulsating energy by the European peoples, while the disease swings its lash unchecked in the Orient.

The same light, rising for Occidental and Mohammedan physicians alike, spent its luminosity over a second great battle, which constitutes an additional title to fame for the Middle Ages: the campaign against an acute infectious disease, which, like the destroying angel, again coursed over the Mediterranean from the Orient, the plague. Stirred by the "Black Death," which arose about the middle of the fourteenth century, the public officials of Italy and Southern France, during successive decades into the next century, with Venice and Marseilles as pioneers, created the whole system of sanitary control of incoming vessels, of observation stations, isolation hospitals and disinfection procedures. All this was adopted by the Renaissance and is still practiced by modern hygiene, in more definite and rigorous form with relatively few changes. An energetic attempt to establish order in the infected cities was made, without, however, the consistency and purposefulness of the prevention of importation. Three dates may be cited in this connection: 1374, Venice, being again threatened by importation of the plague, denied entry to the city of all infected or suspected ships, travelers and freight; 1377, Ragusa, in Dalmatia, rejected all travelers from plague districts, who had not sojourned for a month at one of two designated points, without developing the disease; 1383, Marseilles erected her first quarantine station, at which, after rigid inspection of the vessels, all travelers and cargoes from stricken or suspicious ships were detained for forty days, exposed to air and sunshine. These are the principles of preventive medicine in the Middle Ages, created by physicians and authorities in common endeavor, in amplification of an idea called into being by the campaign against leprosy.

Finally, another idea which can be counted among the great hygienic thoughts and contributions of the past, the spirit of Christian mercy, expressed in form of hospitals for the poor, aged, infirm, and sick; a noble social blossom of young Christianity, which sprouted on the Jewish tree, but developed in self-directed manner from the time of Basil the Great of Caesarea. An idea which, in the early days of Byzantium, was in intimate sympathy with Greek medical science, as is evident from regulations governing medical service in the hospitals, preserved from the period of the Comnenes,³ while in Western Europe it was not until a much later date that healing the sick by actual treatment became the chief task of hospitals. Nevertheless, their hygienic importance was tremendous, since hospitals formed only a fraction of Christian eleemosynary institutions of mediæval and modern times, and served definitely as a pattern for the wonderfully developed system of socially benevolent institutions which constitutes one of the greatest claims of modern times to recognition in the field of applied hygiene. It holds its own with the scientific contributions of modern biologic medicine to hygiene, contributions which are the result of original thought and independent development, no matter how much is unconsciously related to the personal hygiene of the ancient Greeks; while the biologic concept of the theory of infection itself must be characterized as purely modern, since, after all, it owes the first clear conception to Girolamo Fracastoro (1546) finding in Ignatius Philip Semmelweis and Joseph Lister its great, genially intuitive, practical interpreters, while Louis Pasteur and Robert Koch were its master investigators along purely scientific lines and thus the best equipped to rede its riddles.

³ Referring to the Byzantine family which occupied the throne of Constantinople during 1057-1059 and 1081-1185.

A PATRONAL FESTIVAL FOR THOMAS WILLIS (1621-1675)

WITH REMARKS BY SIR WILLIAM OSLER, BART., F.R.S.

By HENRY VIETS, M.D.

NEWTON, MASS.

A YEARLY festival in honour of a medical worthy is certainly an occasion of note, especially if it has been held annually for one hundred and eighty three years, and is still observed in England, in spite of the War. Last fall, news came to Oxford, England, from the little village of Fenny Stratford, Buckinghamshire, that the exercises in

it to St. Martin. It was so dedicated because Thomas Willis had lived in St. Martin's Lane, London, had died on St. Martin's Day and had acquired his wealth and fame as a seventeenth century practitioner in the Royal Parish of St. Martin's-in-the-Fields. The fortune fell to his grandson. During the life of Browne Willis, a festival was held annually in honor of his grandfather. When he died he left the following note:

" . . . and I do make it my request . . . that they will with all due solemnity ever keep up and see to the annual celebration of S. Martin's Festival . . . in the Church of Fenny Stratford, in the manner as I have solemnized it annually . . . for 26 years, in all which time I have been constantly present and heard a sermon."

He also left for an endow-

ment fund two old houses near the church. The cottages were pulled down a few years ago, being no longer fit for occupancy, and the money was invested in a war loan.

The festival itself, as celebrated last year, has some interesting features, not the least of which are the "Fenny Poppers." The poppers consist of six small iron mugs which are filled with powder, placed in a field and fired off, like a cannon, by a fuse. The original poppers of Browne Willis's time have been broken, but some thirty years ago six



St. Martin's Church, Fenny Stratford, Buckinghamshire, England. Built in 1731 in honor of Thomas Willis by his grandson.

honor of Thomas Willis would be held as usual on November fourteenth and that Sir William Osler would deliver the "oration" of the day. I was fortunately able to attend this exercise and I am sure that a short account of the proceeding would be of interest to some of the readers of the *Annals of Medical History*.

The festival had its beginnings in 1734, three years after Browne Willis had built a little parish church in his home village, in memory of his grandfather, and dedicated

new ones were made, modeled after the old ones and these are fired off yearly by the church wardens in strict accordance with Browne Willis's wishes. Another feature is the church service which this year was held in the little brick church late in the afternoon of November 14, 1916.

The church stands on high ground at the cross roads of the town, one of which is Watling Street, the old Roman road. The north side is the oldest part, built in 1726. Just inside the door, the Fenny Poppers are kept. Inside the chapel, most of the interest falls on the north aisle. The ceiling is exceptionally fine, being decorated in colors with forty armorial shields, with a "cave" around it of twenty-six more, the crests of all the donors of ten pounds or more to the original building fund. These are beautifully executed and have recently been retouched under the skillful direction of Dr. William Bradbrook, a local antiquarian with the best interests of medical history at heart. The ceiling to-day is one of the best preserved armorial ceilings in England. The tomb of Browne Willis stands at the further end of the north aisle. In a small room beside the altar is hung an engraving of Doctor Thomas Willis, dated 1742, under which Browne Willis has written—

The Bishop of Buckingham preached a short sermon. Some sixty good church members were there with twenty medical men from Fenny Stratford and the surrounding country. It was an impressive service. The bishop had an appropriate text, "The old is good," and one felt that under the guidance of the Church, such an annual festival spirit would never relinquish.

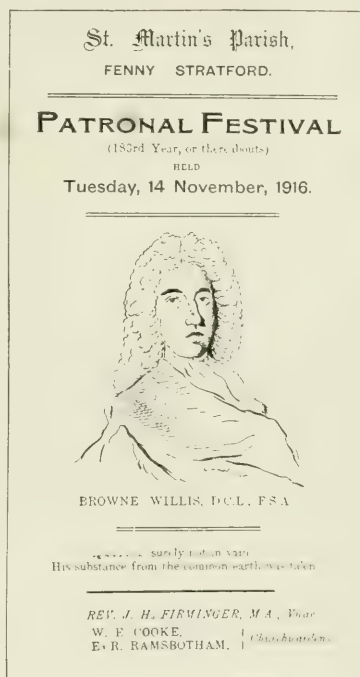
After the service, we wandered across the street to a comfortable old English tavern and about thirty sat down to a jolly dinner. Later, in the town hall, coffee was served by the ladies of the parish. There was an exhibition of a number of old engravings of the church, some old books and other objects of interest.

When Sir William Osler was called upon to speak the hall was crowded with the villagers from miles around. His presence in Fenny Stratford was a red letter day for this little country town. Sir William Osler was at his best in his talk on "Willis the Anatomist," not a bit of which was lost on

these simple country folks and honest practitioners. The spirit of medical history is dear to the heart of many English physicians and most of them pride themselves on being antiquarians. As Sir William Osler's talk was not written, I can only give it as it appeared in the local paper.

REMARKS OF SIR WILLIAM OSLER

"As Fenny Stratfordians, you do well to cherish the memory of the distinguished family to which the parish is so much be-



In Honour to thy memory, blessed shade,
Was the foundation of this Chapel laid.
Purchased by thee, thy son and I, their heir
Owe these three mannours to thy art and care.
For this, may all thy race, thanks ever pay,
And yearly celebrate St. Martin's Day.

holden. It is not always easy to find enthusiasm for an annual festival, but St. Martin of Tours is a jovial host whose name is associated with all sorts of good living and better company. That the annual dinner preceded and did not follow the oration suggests a wise provision on the part of the Saint to whom a personal reference stirs my blood when I think of some far-away ancestor whose hostelry was so good and whose hospitality, I hope, was so free that his guests, in gratitude, called him by the name of his house; the name from which my own name is obviously derived. It is fitting that the Regius Professor of Medicine at Oxford should come here to honour a family to which Thomas Willis, the anatomist, grandfather of their founder, belonged. This is the first time, I believe, in the many years you have held the festival, that my chair, the University and the College to which Willis belonged, have been honoured in this way. Another reason for my presence is that I happened to be curator of the Bodleian Library to which Browne Willis was a very generous donor. Then, I have the great pleasure to be the friend of Dr. Bradbrook, your townsman, who has done so much to keep alive the memory of Browne Willis. This evening I wish to speak of Willis, senior, the physician, whom you all know in the profession, and of his circle at Oxford. Thomas Willis took his M.B. in 1646, and began his practice in a house, still existing, known as Beam Hall. He had a special interest in the Church of England, and during the Cromwellian occupation of the city, the services of the Church were held twice a day in his house. One of the most famous pictures hanging in the hall in Christ Church shows John Fell, John Dolben and Richard Allestree with a copy of the Liturgy open before them. That picture may have been taken in Willis's house opposite Merton, where

these three men, all great friends, were in the habit of attending the service of the Church of England twice daily. Willis married for his first wife a sister of John Fell, the Dean of Christ Church. Browne Willis's devotion to the Church was natural—his grandfather had it before him. To Willis's special circle in Oxford belonged a most interesting group in the history of science in England.

The awakening of science in England had begun in the early part of the 17th century, and perhaps the first scientific work of first rank to be published in Great Britain, was Gilbert's *De Magneto* (1600). Harvey's memorable work on the 'Circulation of the Blood' appeared in 1628. Harvey was himself at Oxford during the period in which Willis was an undergraduate. Whether they ever met or not is not known, but whilst there he met a group of men whose lives and works as the founders of the Royal Society have had the greatest influence of any single group of men on the development of science in this country. Wallis himself told the story of the Society's meetings, first in London and then in Oxford. Most of the scientific subjects they discussed had been set on foot really within the previous thirty years, chiefly by the remarkable observations of Galileo. These men, who had an important influence on the subsequent development of science in this country, deserve to be held in remembrance. Seth Ward, who was subsequently Bishop of Exeter and of Salisbury, was the centre around whom the majority of these scientific men revolved. He was 'a profound statesman, but a very indifferent clergyman.' Wallis, who was also a Cambridge man, was, more than any single man, the living spirit in the formation of the Royal Society. He was a great mathematician, and, in a most astonishing mathematical dream, extracted the figure root from

eight groups of figures—and it was correct. He became Professor of Geometry at Oxford, and his reputation as a mathematician extended throughout Europe.

and became so much interested in the studies that were in progress with Willis, Boyle and others that at first he studied medicine; and it is a remarkable fact



SIR WILLIAM OSLER

Another man who had quite a great influence was Wilkins, Warden of Wadham, a very ingenious man with a good mechanical head, who was afterwards Bishop of Chester. In Wadham College is still shown the early meeting room of the Royal Society in Oxford. Perhaps the best remembered genius of the group is Christopher Wren, who was an undergraduate at Wadham College in 1649,

that the distinguished architect was the first in England, probably in Europe, to invent a method for the transfusion of blood from one human being to another, or from one animal to another. He is also remembered as the first man who made drawings from the microscope. He also did many of the drawings for Willis's works. Another remarkable member of the group was the Hon. Robert Boyle,

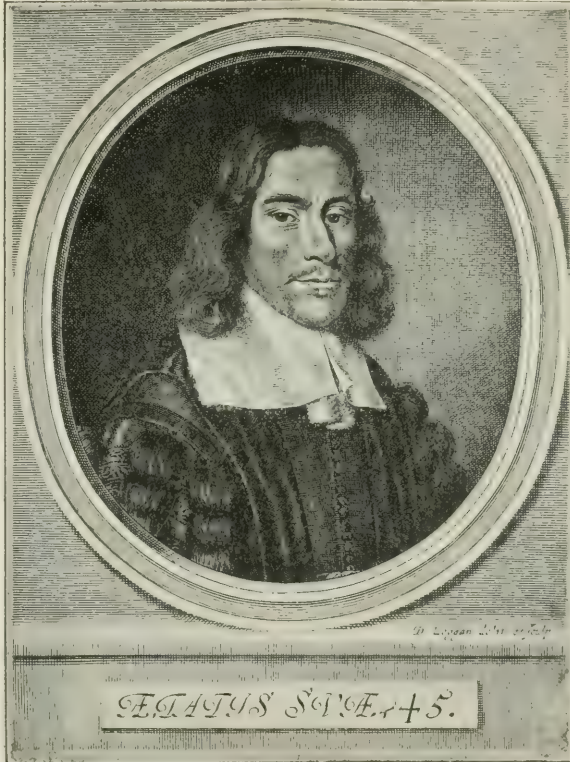
son of the Earl of Cork. He was a great exponent of the experimental method, and every elementary student of physics still knows him through Boyle's law. It is astonishing when one thinks how much Boyle did, how little was the impression he made. It was probably due to the fact that he was rather a rough experimenter; he had a better mind than hands. Coördination of head and hand are necessary for a great experimenter. But he did a great work in stimulating research and a good deal of the reputation of English science on the continent was due to him. Another extraordinary character in the group was that genius, Sir William Petty, who made the Down Survey in Ireland, and was the founder of the science of political economy. He went to sea at eight or nine years of age, and while being nursed in France for a broken leg he began a career of money-making. He went to Paris with no other capital than his native wit, became a doctor, and came to Oxford at the time one of my predecessors had the fortunate habit of fainting whenever he saw a dead body, so it was impossible for him to do dissection. Petty was made Professor of Anatomy, and joined this circle of Boyle's, and was a most invaluable member of it. He became well-known throughout the country as the resuscitator of Ann Green, a young woman who was 'hanged by the neck until she was dead,' and then handed over as a perquisite to the Professor of Anatomy, who claimed the bodies of all criminals for dissection. In spite of the fact that the relatives had tugged at the rope, before the body was cut down and had jumped on her to make sure she was dead, Petty resuscitated her, and she lived for many years and became a very respectable member of the community. It was a great loss to Oxford when Petty went to Ireland; he is of interest to the present generation as the founder of the Lans-

downe family. Other remarkable men of the circle were Sydenham and John Locke, the author of the 'Essay on the Human Understanding,' which even an ordinary woman can read. There is no one in the room who would not be improved by a careful study of this book over a period of several years. The last man of the circle is Lower, who did a good deal of work for Willis, whose name is remembered by the smallest single fragment in the human body. It is astonishing on how small a cork a man will float down the ages. He did, however, a great deal of good work, especially in the dissection of the brain. These were Willis's friends during the years he was a practitioner in Oxford.

Willis did two things; he made himself a good scientific man as far as the science of that day went, and he made himself a first class practitioner, and those two sides of the man are presented in his works. It is not possible in a mixed audience to go into the character of his work, but there are one or two things that will interest you. The first of his collected works was a 'Study of Fermentation.' From time immemorial, it had been one of the great mysteries how certain bodies undergo the extraordinary change known as fermentation, and why at the end of the fermentation there was such a good change in the liquid. Willis studied this mystery and made it still greater in the pages he devoted to it. But he grasped one very important thing, the analogy between a fever and fermentation. He made the very interesting observation that there is no difference between the vintner and the physician; when the vat becomes too full in fermentation the vintner draws off some of the liquid, and he said: 'What is that but what we do with blood fermenting in a fever?' That was a good reason for phlebotomy. It was not until 1857 that the problem of fermenta-

tion was solved by Louis Pasteur, who showed that fermentation is not a pure chemical process, but due to changes owing to the growth of living bodies in the fluid. That is the greatest single discovery as far as the welfare of humanity

showed that if one took the tiniest little drop on the point of a needle from a fermenting fluid and put it into a sugary solution it would create fermentation; and, in just the same way, the tiniest drop of blood from an animal suffering from



THOMAS WILLIS (1621-1675)

is concerned, and it has had the farthest reaching influence of any single discovery of the century. It revived the parallel which had been drawn 300 years before between fermentation and fever. Fracastorius had called attention to it in the 16th century, and Boyle had said that the man who would solve the problem of fermentation would solve the problem of infectious fevers. Pasteur solved both. He

anthrax would cause identical changes to occur in the blood of another animal; there would be a multiplication of the germs, a change in the fluid, and at the end of the fever produced by the anthrax one could not induce the fever again by inoculation. That was the foundation of our modern treatment of infectious disease and the antiseptic treatment of wounds.

Besides this subject of fermentation,

Willis also dealt with intermittent fevers and enteric or typhoid fever. He was one of the first to describe an epidemic in 1643 in the army of Essex besieging Reading. He reported also on an epidemic in 1661. It is interesting to see what he prescribed for typhoid. One would not care to have typhoid fever and to be treated by Willis. The patient would be lucky if he were not bled, dosed with all the available purges in the *Pharmacopœia*, sweated, given two or three active vomits and blistered on the calves of the legs, the abdomen, and probably the back. These were five articles of the treatment of fever that the public at present is spared. Willis was one of the first to describe typhoid fever in epidemic form, and one of the first to give an accurate description of child-bed fever. He was the first to give an accurate account of the disease known as diabetes, and he recognised the saccharine or sugar variety from the ordinary form. He is better remembered to-day by his big work on the brain. He did a really fine piece of study on the human brain, and it was the best book of its date on the nervous system, not only in the description of the anatomy of the brain, but of the anatomy of the nerves, in which he was greatly helped by Lower's sections and Wren's drawings. His classification of the nerves of the brain remained in England until my own generation. Willis is remembered particularly by the description of certain blood vessels at the base of the brain known as the circle of Willis. A great part of Willis's book is taken up with a '*Pharmaceutica rationale*.' It is as dead as Willis. It gives me a shudder to

think of the constitutions our ancestors had, and of how they withstood the assaults of the apothecary.

It is really a wonderful age to live in, more for what the human body misses than for what we have. When I look through the list of drugs that were given and the prescriptions that were then followed, I feel that the public has to thank the profession for having got rid of so many nauseous and horrid drugs. We still have a fair number, not that the profession likes to give, but the public will have them. In some of Willis' prescriptions, there were ten to fifteen different ingredients—each worse than the other—besides vomits, purges, sweatings, diuretics, cordials and opiates. Sydenham and Willis probably owed much of their reputation to their knowledge of how to use opium. Willis wrote, amongst other things, two discourses on the soul of brutes, which would be a very good exercise for any medical student or doctor. Altogether, Willis is an interesting character to contemplate. I have known him for a good while and I have known him far better since I had your kind invitation and have had to read Willis's large book through, from which I got a great deal of information I did not want, and have refrained from giving to you. I have only picked out a few parts here and there, but it has been a pleasant task, and I feel a good deal better for it. Willis was a great and a good man, and the 15th Psalm the Chairman has read at the service is most appropriate. It just suited him. There are many good descriptions of the upright, righteous man, but none better than that in the 15th Psalm, which fits Willis to a 't.'"

MEDICINE AND MATHEMATICS IN THE SIXTEENTH CENTURY

By DAVID EUGENE SMITH, LL.D.

NEW YORK CITY

NO one who gives serious attention either to the history of medicine or to the history of mathematics can fail to be struck by the number of physicians who have excelled in mathematics and astronomy, and by the number of mathematicians who have been skilled in the healing art. The cases are so numerous as to surprise even those who would naturally be familiar with the connection between the two sciences, and they are by no means confined to any single race or to any particular period. To enter into an exhaustive study of the matter would be impossible within the limits of a paper of this character, such a study of the Arab civilization alone being enough to fill a printed volume.¹ All that can be attempted under the present circumstances is to consider some of the causes of the phenomenon and to speak of its development in the century of its greatest prominence, namely, the period from 1500 to 1600.

When we seek for the cause of any occurrence whatever, as of some disease or of some event in the domain of astronomy or history, we always find that it is by no means unique. Various contributing influences enter into the situation, and so it is with the close relationship between the medical and mathematical sciences.

¹ For example, in Wüstenfeld's list of 300 Arabian physicians ("Geschichte der arabischen Aerzte und Naturforscher," Göttingen, 1840) there are the names of 38 prominent mathematicians, while many of the others were doubtless interested in the subjects of astronomy or mathematics. In Suter's list of 528 Arabian mathematicians ("Die Mathematiker und Astronomer der Araber und ihre Werke," in *Abhandlungen zur Geschichte der math. Wiss.*, Leipzig, 1900), at least 85 are known to have been physicians.

One of the most potent causes in this case was the general belief, both in ancient times and in the Middle Ages, in the influence of the stars upon human life. Astrology therefore became the handmaid of medicine and was looked upon by the intellectual world as part of the equipment of the man who aspired to highest rank in the medical profession. Great stimulus was given to this idea through a translation of a passage in Hippocrates in which the master speaks of *τι θεϊον* in disease, a term which the early translators rendered by *caeleste* instead of *divinum* and which was thus thought to refer to the influence of the heavenly bodies.² Moreover, there was much to encourage the belief because of the manifest curative powers of the sun, of the influence of the moon upon human emotions, and of the force of tradition derived from the religious beliefs of the ancients in the power of the stars. To our somewhat more scientific minds a little of this belief seems warranted; but we of the present fail to comprehend the further belief in horoscopes or to recognize that the best scientific minds of a few centuries ago failed as completely to take our own point of view. That a man like Caspar Bartholinus (1585-1629), father of the mathematico-medical scholar Erasmus Bartholinus (1625-1698) and professor of medicine at the University of Copenhagen, should have seriously advocated the claims of astrology³ only three centuries ago seems to us quite beyond reason, but such cases were by no

² E. Withington in Little's "Roger Bacon Essays," Oxford, 1914, page 343.

³ "Astrologia, seu, de stellarum naturâ," Wittenburg (?), 1612, and his "De astrologia," Rostochii, 1616.

means rare at that time or even up to the close of the eighteenth century.

To this belief in the power of the stars is partly due the development of the Greek-Alexandrian sect of iatromathematicians,⁴ a sect that has its origin in the superstitions of the ancients long before the period of Hermes Trismegistos.⁵ The beliefs of these iatromathematicians, relating chiefly to the application of astrology in the domain of medicine, have been clearly set forth by Sudhoff, particularly as they showed themselves in the fifteenth and sixteenth centuries.⁶ These beliefs are to be found in the writings of some of the best scholars of earlier times, such as the Rabbi ben Esra of Browning's poem, who asserts that a lunar eclipse at the beginning of an illness has a baneful influence, that a solar eclipse prolongs the period of sickness, and that a conjunction of planets or of the sun and moon is a very dangerous sign. Another such writer was the Arab scholar Alcabitus (fl. c. 965),⁷ whose work on astrology was translated by Johannes Hispalensis and commented upon by Johannes de Saxonia.⁸

Still another example, and this from the thirteenth century, is seen in the case of Roger Bacon.⁹ This remarkable man touched all branches of science then known, and in particular he wrote upon medicine as set forth by the school of Galen and by the Arab writer Avicenna.¹⁰ Just as he antagonized the mathematicians of the day, so he asserted that contemporary medicine

abounded in error. He stated it to be his belief that the *antiqui* had a sort of primitive medical revelation which endured through the periods of Chaldean, Greek, and Arab ascendancy, although dimmed by the errors and defects of the *Latini rustici*.

Once the belief is established that astrology has value in the equipment of the physician, it is evident that a certain degree of proficiency in mathematics will be looked upon as necessary in his education. He must know something of angle measure, must be able to use astronomical tables, and must be fairly well equipped as a computer. This explains in part the relation of mathematics to medicine in that period in which printing first made learning really popular, namely, the sixteenth century.

There was also another potent influence leading to the development of the iatromathematicians, namely, the universal ancient belief in number mysticism, a belief which had not died out in the seventeenth century and which is not unknown even to-day. *Deus imparibus numeris gaudet* is a phrase as old as the period of the Pythagoreans, and even to-day the belief that "there is luck in odd numbers" is very general. The recognition of the influence of the number seven in medical literature, until recently almost universal, a recognition due in large part to a work long attributed to Hippocrates himself but probably spurious, is an illustration of this belief. The superstitions relating to numbers like three

⁴ Ἰατρομαθηματικοί

⁵ See his Ἰατρομαθηματικά in Patricius, "Nova de Universis Philosophia" (1593). On his general beliefs in the subject, see "Die Lehren des Hermes Trismegistos" by Josef Kroll in the *Beiträge zur Geschichte der Philosophie des Mittelalters*, Bd. XII. Heft 2 4, Münster i. W., 1914, pp. 206 seq. and 367 seq.

⁶ "Jatromathematiker, vornehmlich im 15. und 16. Jahrhundert," in the *Abhandlungen zur Geschichte der Medizin*, Breslau, 1902, Bd. II. The term has also been applied to those interested in the general use of mathematics in medicine.

⁷ Abdel 'aziz ibn 'Otmân ibn 'Alî, Abû'l-Şaqr, el-Qabîsî. The transliteration of Arabic names follows the Suter list.

⁸ This commentary was printed in Venice in 1485 and again in 1521.

⁹ A. G. Little, "Roger Bacon Essays," Oxford, 1914. See the article by the present writer, on "The Place of Roger Bacon in the History of Mathematics," page 153, and the one by E. Withington, "Roger Bacon and Medicine," page 337, from each of which extracts have been freely made.

¹⁰ El-Hosein ibn Abdallâh ibn Husein ibn 'Alî, Abû 'Alî, el-Şeich el-Ra'îs, Ibn Sînâ (980-1037).

and seven, with their squares, have all the appearance of being transmitted from the East, possibly through Pythagoras himself; but at any rate they were powerful enough to interest the medical profession for many generations in the mysticism of number.

This number mysticism naturally led to the use of amulets such as the Thibetans and others of the East wear to-day, — plates on which magic squares, the mystic trigrams of the Chinese, and the signs of the zodiac are engraved. These are closely related to various instruments of divination in which number played a leading part. This subject is so extensive as to permit only of brief mention at this time, and a single illustration will serve to show its importance.¹¹ Tradition relates that the astrologer Petosiris dedicated to King Necho, of the seventh century B.C., a sphere of wondrous power.¹² To foretell the outcome of the sickness of a patient it was only necessary to add the numbers corresponding to the Greek letters of the name of the disease, to add to this sum the number corresponding to the day of the month on which the invalid took to his bed, to divide the result by 29 (approximately the number of days in the lunar month), to note the remainder, and then to consult the magic sphere. This sphere was divided into six cells, the upper three being the cells of life and the lower three those of death. Whether the patient would live or die was determined by the group of cells in which the remainder was found, and whether the recovery would be speedy or slow was determined by the particular cell in the group.¹³ It will at once be seen that there is a connection between this superstition and that of gematria, the theory of finding

the attributes of a person from the numerical value of his name obtained by adding the numerical values of the letters, a subject too extensive to admit of discussion at this time.

A fourth reason why the medical class in the Middle Ages was led to a study of mathematics is found in the imagined need for the compounding of drugs in such proportions as to bring out their *dynamidiæ*. This need led the physician to the study of alligation, as the alchemist and the mint master were also led, and it is, of course, even more potent in carrying out the scientific work of to-day. It was very likely this influence that led a man like Arnaldo de Villanova (1235-c.1313), or Arnaldo Bachuone, to study mathematics. Teaching medicine in Barcelona and Paris, physician to Frederick of Sicily, a prominent practitioner in Rome, Bologna, and other great centers, known chiefly for his writings on alchemy, Arnaldo was the type of man who would naturally be led to imagine a close connection between medicine and number, and between alchemy and astrology. So whether the aspiring physician, when Salerno began to encounter serious rivalry, went to Padua, which leaned to the astrological doctrines of Pietro di Abano (c. 1250-1316),¹⁴ or to Montpellier, which favored the alchemy of Arnaldo, he was sure to come in contact with some form of mathematics.

A fifth influence to be noted, even though this is not the place to discuss it historically, is that of the study of optics, especially on the part of the physician who specialized in the treatment of the eye. Upon this topic there is a large literature, beginning promi-

¹³ See also "Nechepsonis et Petosiridis fragmenta magica," in *Philologus*, Suppl. VI (1891-1893), pp. 382-383.

¹⁴ Also known as Petrus Aponensis, professor of Medicine at Padua. His "Astrolabium planum" was published at Venice in 1502, his "Geomantia" at Venice in 1556, and his "Opera artis" (on alchemy) at Paris in 1567. Sudhoff gives the dates 1253-1319 (?).

¹¹ For further discussion, see Wickersheimer, "Figures Medico-Astrologiques des IXe, Xe, et XIe Siècles," in *Janus*, 1914, Vol. XIX, pp. 157-177.

¹² This sphere seems, however, not to be older than the second century B.C. For discussion, see Sudhoff, *loc. cit.*

nently with the Arab scholars and spreading thence to the West, particularly in the thirteenth century, one of the most remarkable periods in the world's intellectual progress.

A sixth reason why physicians were so commonly led to the study of mathematics is to be found in the general belief in the influence of comets upon human health. This is quite independent of the belief in astrology, and it proved to be so strong as to attract the attention of a considerable number of physicians in the sixteenth century, and to lead them to a sufficient study of mathematics to make use of armillary spheres and astrolabes for locating the comets in the heavens. An example of this is found in the case of Fernández Raxo y Gómez (d. 1695), a graduate in medicine at Valencia, physician to Philip II, and the author of a well-known work on the influence of comets.¹⁵

It is especially appropriate in this connection to mention one more influence leading the physician to the study of mathematics, since this makes the mystic number seven, and so I refer to the fact that medicine was a very natural gateway to mathematics in the early universities. A young scholar was offered four great possibilities in the mediæval period, namely, theology, philosophy, law, and medicine. Of course he might follow out his mental bent without taking any of these paths, but these were the enticing ones. If his taste was for science in any of its branches, the path of medicine was the natural one to follow, since, as we have seen, medicine had as auxiliary sciences astronomy (which was mathematics par excellence in those days) and alchemy, and made not a little use of physics. Scientific training, therefore, found its path of least resistance through medicine.

¹⁵ "De Cometis, et prodigiis eorum portentis libri quatuor," Madrid, 1578. A Spanish bibliographer remarks that "era más bien filósofo que astrónomo."

An illustration of this general combination of all the sciences under the guidance of medicine is seen in one of the sumptuous volumes that came from the Aldine press at the opening of the sixteenth century, written by Georgius Valla, the elaborate title beginning: "Georgii Vallæ Placentini viri clariss. de expetendis, et fvgiendis rebvs opvs, in qvo hæc continentvr." Valla was born at Piacenza in 1430 and died at Venice in 1499. He lectured on physics and medicine at Pavia and also at Venice, and translated various writings of the Greeks, both medical and mathematical. His *magnum opus*, above mentioned, treated of Boethian arithmetic and music, of Euclidean geometry, of medicine and optics, of astrology and the astrolabe, of rhetoric, poetry, and law, and of most of the other great branches of human knowledge. Much of the work is devoted to medicine. Thus he has "De Physiologia libri .iiii. . . . De Medicina libri .vii. . . . De Corporis commodis, & incommodis libri .iiii. quorum primus totus de anima, Secūdus de corpore, Tertius uero de urinis ex Hippocrate, ac Paulo ægineta, dēq; Galeni quæstionibus in Hippocratem." Like all such works, this was merely a compendium, but it established Valla's reputation as a physician of great scientific learning, and it serves to illustrate the point in question.

There is much more to say if one desires to enter fully into the relations between mathematics and medicine. The story is one of interesting mysticism, of the Greek, Roman, and mediæval symbols of drugs and numbers, of tetragrams, of exorcisms, of skryers, and of all that borderland between the region of superstition and that of science. The story is therefore a long one, and lest it might prove unprofitable it is better to leave it untouched and to mention a few of the great names in the fields of medicine and mathematics in the sixteenth century.

This century has been selected because

it combines the seven influences above mentioned more completely than was the case before the year 1500 or has been since the year 1600. Before the sixteenth century printing had not been sufficiently developed to make it possible to freely disseminate thought, while after the close of that century superstition began to give way more rapidly than ever before to scientific inquiry.

Before considering the list of sixteenth century mathematico-medical scholars, many of whom were slavish followers of tradition, one name should be mentioned as standing in a class by itself. No list of medico-mathematical writers would be complete without reference to this remarkable genius who was neither a medical man nor a mathematical professor, but who knew more of anatomy and of mathematics than most of his contemporaries who were working in these fields. The works of Leonardo da Vinci (1452-1519) in mechanics, in astronomy, in the study of the infinitely great and the infinitely small, and his familiarity with the writings of the scholars who had made mathematical physics, all show the same remarkable acumen that he revealed in connection with the study of the heart and the circulation of the blood. Had Leonardo not been one of the world's greatest artists he would have been known as one of the world's greatest anatomists; had not the other phases of his genius overshadowed his work in mathematical physics, he would have been known as one of the world's greatest scholars in this important field. The contributions of Dr. Arnold C. Klebs to our knowledge of his work on the circulation of the blood were a revelation to most of us who thought that we knew something of Leonardo's scientific attainments, while even a brief consideration of his fragmentary work in mathematics will convince anyone of his real ability in this field as well.

I now propose to mention a few of the

other leading names among those whose tastes led to the study of mathematics as well as medicine, and to speak very briefly of their labors. After that it will be quite enough to enumerate, for purposes of reference, the names of others who, in that century, cultivated more or less impartially the two sciences under discussion.

It usually happens that a really great man attains his dominant position in one line, his other lines of interest being so completely overshadowed as to be forgotten. Of course there are exceptions to this rule, as in the cases of Descartes, Pascal, Leibnitz, and particularly Leonardo da Vinci; but in general it is a law that is almost axiomatic. For this reason few in the medical profession will recall the fact that Galileo (1564-1642) was at least a novice in their guild. This, however, is the case, for his father withdrew him from the monastery of Vallombrosa, where he had decided to take orders, and sent him to Pisa to study medicine. His observation of the swinging lamp led not only to his study of the law of the pendulum but to his use of this device for measuring the frequency of the pulse.¹⁶ His tastes, however, were toward applied mathematics, and so he secured his father's consent to give up the study of medicine and to endeavor to make a name for himself in his chosen field.¹⁷

As in the case of Galileo, so with Copernicus (1473-1543); it is not generally recalled that he was a physician, as also Canon of the Cathedral at Frauenburg in East Prussia. His mathematical and astronomical studies under Peurbach, Regiomontanus, Domenico Maria, and Brudzewski led him to devote his energies to the mathematical side of astronomy with an intelligence that made for the success which the world has long since recognized.

¹⁶ Paolo Frisi, "Elogio del Galileo," Milano, 1778, p. 14.

¹⁷ "Le Opere di Galileo," Firenze, 1856, tomo xv, p. 334.

Of all those who achieved a reputation in the fields of mathematics and medicine in the sixteenth century, none was more notorious, to say the least, than Girolamo Cardano¹⁸ who was born at Pavia in 1501. He was the illegitimate son of a jurist, Facio Cardano, a man who had also taken a degree in medicine, had given some attention to mathematics, and had edited Archbishop Peckham's "*Perspectiva Communis*," and of a mother who had a reputation that was none too good. Students of heredity may find here a fertile field for speculation, for Girolamo certainly combined in his nature some of the highest and some of the lowest elements. He was at once an astrologer (not a great reproach at that time, however) and a serious student of philosophy; a gambler and a first-class algebraist; defender and father of a murderer and at the same time a physicist of high ability; a liar and at the same time a physician of repute; an inmate of a poorhouse and a professor in the University of Bologna; a victim of blind superstition and rector of the College of Physicians at Milan; a heretic who ventured to publish the horoscope of Christ and a recipient of a pension from the Pope. While only twenty-one years of age he taught mathematics at Pavia; at the age of twenty-five he took his degree in medicine at Padua, practicing for seven years at Sacco. In 1534 he became professor of mathematics at Milan, at the same time practicing and teaching medicine. He died in Rome in 1576.

Cardano's greatest mathematical work is the "*Ars Magna*" (1545), a work in which the solution of the cubic equation first appeared in print, although apparently secured under the pledge of secrecy from Tartaglia. He wrote, however, numerous other works on mathematics, physics, philosophy, and astronomy, and a number of "oposcoli" on medicine, published and unpublished. Among the medical writings giv-

en by him in his own list, are the following: "Delle cause, dei segni e dei luoghi delle malattie," "Picciola terapeutica," "Degli abusi dei medici," "Delle orine, libro quattro," and "Sulla medicina di Galeno," but a careful modern edition of his works has not appeared, and a systematic search for his unpublished manuscripts has probably not been made. Among his works was also a commentary on the anatomy of Mundinus.

Cardano's own opinion of a medical career is familiar to all who have looked into the history of medicine, but it may be interesting for others to read. He says, in his garrulous autobiography: "If I had money to earn, I could earn it as a doctor, and in no other way. But that calling of all others (except the glory that attends it) is completely servile (*tota servilis est*), full of toil, and (to confess the truth) unworthy of a high-spirited man (*ingenuo viro indigna*), so that I do not at all marvel that the art used to be peculiar to slaves."¹⁹

The most popular writer on arithmetic in the Latin language in the sixteenth century was Gemma Regnier or Rainer (1508-1555). Having been born at Dockum, in East Friesland, he was known as the Frisian, or commonly as Gemma Frisius. He was only thirty-two years old when his "*Arithmeticae Practicae Methodus Facilis*" was published at Antwerp (1540), and so favorably did this work strike the popular taste that it went through at least fifty-nine editions in the sixteenth century, not to speak of many later ones. He also wrote on astronomy and geometry, acquiring a high reputation as an author if not as a mathematician. Soon after publishing his arithmetic he took the degree of doctor of medicine and then gave up his mathematical studies. While nothing was published upon medicine under his name during his lifetime, there is, in a work printed at Frank-

¹⁸ Morley, "Jerome Cardan," II, 283; "Opera," I,

¹⁹ Jerome Cardan, Hieronymus Cardanus.

fort in 1592, a "Consilia quædam de arthritide" attributed to him.

Among French physicians of the sixteenth century there stood out prominently one whom his admirers called the modern Galen, Jean Fernel (1497-1558), who received his doctorate from the Faculté of Paris in 1530. Four years after receiving his degree he became a professor in Paris, and soon rose to a position of leadership in the medical profession. His "Universa Medicina" (1567) went through more than thirty editions. In the field of mathematics he published two works, "De proportionibus" (1528) and also two in the field of astronomy, the "Monalosphœrium" and the "Cosmotheoria." His work in geodesy was also noteworthy, his computation of the length of a degree of the meridian being 56,746 toises, although it is really 57,024 toises, — a good approximation for the time.

Of the English scholars who cultivated both mathematics and medicine in the sixteenth century, Robert Recorde was the most prominent. Born at Tenby, Pembroke, c. 1510, he studied at Oxford and Cambridge, and received his degree in medicine at the latter university in 1545. He taught mathematics at Oxford and very likely at Cambridge, became royal physician, and wrote on medicine as well as mathematics. It was in the latter field, however, that he attained his chief prominence. His arithmetic, "The Ground of Artes," appeared between 1540 and 1542 and went through at least thirty editions, being the most popular work that appeared in England upon the subject in the first two centuries of printing. He wrote also "The Castle of Knowledge" (1551), a work on astronomy; "The Whetstone of Witte" (1557), a work chiefly on algebra, and the one in which the present sign of equality (=) first appeared in print; and "The Pathway to Knowledge" (1551), a work on geometry, written, like the others mentioned, in catechism form.

His medical work, "The Urinal of Phy-

sic," appeared in 1548 and went through several editions, being as popular in medical circles as were his mathematical works in the field of general education.

His end was not what one would have expected for a man who had been permitted to dedicate one of his works to "Princesse Marie," over his signature of "Robert Recorde Physicion;" who had administered to the medical needs of Edward VI and of Mary Tudor, and who had written the most popular mathematical books that England had known. He was imprisoned for debt in Southwark Prison, and died there, probably soon after June 28, 1558, the date of his will.

Among the physicians whose mathematical attainments were much above the average to be found in those who devoted themselves wholly to the exact science, there should be mentioned Ludovico Lilio (1510-1576) who was one of the astronomers called by Gregory XIII to consider the change of the calendar. It was substantially his suggestion for reform that was adopted. Unfortunately he died six years before the new calendar was put into general use, and so he did not live to see the fruition of his labors in this important field.

In Belgium, contemporary with Galileo, there lived the well-known Adriaen van Roomen (1561-1615) who divided his time rather impartially between medicine and mathematics. He lectured on both subjects at Louvain and upon mathematics in Würzburg, where he was physician to the bishop, and he was at one time mathematician to the king in Poland. He is best known in mathematics for his computation of the value of π to sixteen decimals,²⁰ but he wrote also upon other geometric subjects.²¹

²⁰ In his "Ideæ mathematicæ pars prima," Antverpiæ, 1593.

²¹ In "Archimedis circuli dimensionum expositio et analysis," Wirceburgi, 1597; "Mathesis polemica," Francofurti, 1605; "Canon triangulorum sphaericorum," Moguntiae, 1609.

Interested in the same line of mathematical study was his contemporary Adriaen Metius (1571-1635), or Adriaen Adriaenszoon, who was a professor of mathematics and medicine in the university at Franeker, but whose writings were all in the line of mathematics and astronomy. He also is well known for his approximation to the value of π .²²

Among those of less importance in the combined fields of medicine and mathematics in the sixteenth century was Jacques Peletier (1517-1582). He was a man of some ability in mathematics,²³ but he was too ready with his pen, and this in too many lines of work, to attain a high standing. Interested in law, a voluminous writer in general literature, principal of the Collège de Bayeux, physician at Bordeaux, Poitiers, and Lyons, teacher of arithmetic at Annecy, author of various textbooks on mathematics—including algebra, geometry, and arithmetic—it will be seen that he had little time for serious work in any of his various fields of activity.

Perhaps the most all-round dilettante of the sixteenth century to come within our field is Henricus Cornelius Agrippa (1486-1535). He posed as physician, lawyer, soldier, philosopher, astrologer, and alchemist in various centers of learning, including Cologne, Pavia, Freiburg, Brussels, Bonn, and Grenoble. His "*De Incertitudine & Vanitate Scientiarum*" went through various editions²⁴ and shows at least a superficial knowledge of substantially every science, mathematics ranking equally with medicine in his general condemnation.²⁵

Such were a few of those who added to mathematical knowledge, who were held in

high esteem as healers of the body, or who made some name in literary productions which touched upon both of the sciences. It will, however, be more helpful to those who care to study the intimate connection between mathematics and medicine if a list of some of the others who helped to establish this connection is made accessible to them, and such a list, necessarily much abridged, is given as a supplement to this fragmentary sketch.

Although it has been said above that the sixteenth century was *par excellence* the century of the iatromathematicians, it must not be thought that later centuries failed to find this same intimate relationship between the two sciences. Thus in the century following we find the great Boerhaave (1668-1738), whose reputation as one of the greatest physicians of his time obscured what would otherwise have been an enviable reputation in the field of applied mathematics. So his contemporaries Eisen-schmid (1656-1712) and Guglielmini (1655-1710) represent the union of the two subjects, since it was the "*Diatribes de figura telluris elliptico-sphæroide* (1691)" of the former that gave rise to the dispute as to the elongation of the earth, and the latter was a recognized authority on mathematics as applied to hydraulics. These facts are apt to be forgotten both by the historian of mathematics and by the recorder of medical progress, just as when we see the beautiful colonnade of the Louvre, we forget that Claude Perrault (1613-1688) was not merely an architect but was also a physician and a mathematician. Not many, too, recall the fact that the famous Johann (I) Bernoulli (1667-1748), one of the two broth-

²² His works include "*Doctrinæ sphaericæ libri V*," Francofurti, 1591, and Franeker, 1598; "*Geometrices per usum circini nova praxis*," Amstelodami, 1623; "*Opera arithmetica et geometrica*," Lugduni Batavorum, 1625.

²³ Among his works are "*L'Algèbre, dépar-tée en deux livres*," Lyon, 1554; "*L'Arithmétique, dépar-tée*

en quatre livres," *ib.*, 1554; "*Demonstrationum in Euclidis elementa geometrica libri sex*," Lugduni, 1557.

²⁴ A copy in the writer's library has the double date, Lugduni Batavorum, 1643 and 1644.

²⁵ His "*De occulta Philosophia libri III*" appeared at Cologne in 1510 and again in 1533.

ers who founded the celebrated family of mathematicians bearing his name, held a degree in medicine. His dissertation "*De effervescentia et fermentatione*" (Basileæ, 1690) gave little suggestion that he would become one of the greatest leaders in spreading the knowledge of the new mathematical discipline of the calculus throughout continental Europe; yet such was the case, and his productions in mathematics were of highest scientific value.

Thus it has been through all the centuries, particularly from the ninth to the twentieth, that mathematics and medicine have found much in common, although the two periods in which this has been the most noticeable are the era of the Arab ascendancy and that of the sixteenth century, to the latter of which this brief summary chiefly refers.

A PARTIAL LIST OF THOSE WHO, IN THE SIXTEENTH CENTURY, WERE DISTINGUISHED IN MATHEMATICS AND IN MEDICINE ²⁶

BERNARD ABATIA (1540–c.1590), physician, mathematician, astronomer, jurist, and linguist.

ALESSANDRO ACHILLINI (1463–1512 or 1518) was professor of medicine and of philosophy in Bologna and in Padua. His "*Opera Omnia*" (Venetiis, 1508) contains numerous contributions to medicine, and he wrote also on astronomy and physics, subjects so closely connected with mathematics as to show the trend of his interests.

JOHANN ACRONIUS, or ATROCIANUS (1520–1564), not only practiced medicine at Basle but was also professor of mathematics and of logic in the university of that city. His

²⁶ The list is arranged alphabetically either by the family name or by the name by which the person is commonly known. It includes the names of many prominent medico-mathematicians who were living between 1500 and 1600, but the reader is referred to Sudhoff's list for a considerable number of minor names.

²⁷ His "*Canones astrolabii universalis*" appeared in its second edition at Salamanca in 1554.

writings were in the line of mathematical astronomy. His skill as a physician could not save him from death as a result of the plague.

ADRIAEN ADRIAENSZON. See the article. AGRIPPA. See the article.

JUAN AGUILERA, who flourished in Salamanca in the middle of the sixteenth century, was well known as a mathematician, physician, philosopher, and theologian.²⁷

JUAN ALEMÁN practiced medicine in Spain in the second half of the sixteenth century and wrote on astronomy and astrology.²⁸

JUAN ALMENAR, born in Valencia in the latter part of the fifteenth century, took his degree in medicine and is described as "*el primer español que escribió sobre el mal venéreo*" (1502). He was much interested in astrology, however, "*en la cual llegó á adquirir gran fama,*" and he seems to have written a work on astronomy which was never printed.

JOHANN ASVERUS AMPSING (c. 1559 – 1642), one of the chief authorities on the iatromathematics in the seventeenth century, a native of the province of Upper Yssel. He was a physician of prominence and wrote a dissertation on iatromathematics.²⁹

MELCHIOR AYRER (1520–1579), a physician of Nürnberg, well known in his day as a chemist and mathematician, was skillful in the making of mathematical instruments.

BERNARDINO BALDINI (1515–1600), professor of medicine in Pavia and of mathematics in Milan. His writings were chiefly on astronomy and physics.

PIERRE BEAUSARD (d. 1577), a physician of Louvain, and in later life a professor of mathematics in the university. While not

²⁸ The first edition of his work appeared at Barcelona in 1580, under the title "*Lunari ó repertori del temps compost per lo molt abil astrolec Joan Alemany.*"

²⁹ "*Diss. iatromathica in qua de medicinæ et astronomiæ præstantia indissolubili cõjugio disseritur,*" Rostochii, 1629.

an original genius, he is known for two works of some merit.³⁰

ISAAC BEECKMAN (1570-1637), a physician, director of the Latin school at Dordrecht, wrote "Mathematico-physicarum meditationum," Traject. ad Rhen., 1644.

LATTANZIO BENACCI (1499-1572), physician and professor of astronomy in Bologna, and an astrologer of some repute.

MICHAEL BEUTHER (1522-1587), doctor of law and also of medicine, professor of poetry and also of mathematics in Greifswald, and finally professor of history at Strasburg. He contributed slightly to the literature of the circle and the calendar.

HEINRICH BRUCÆUS (c. 1531-1593), was professor of mathematics in Rome, and afterwards practicing physician as well as professor of medicine and of mathematics in the University of Rostock. He wrote numerous medical works and at least two books on mathematical astronomy.

OLAUS ENGELBERTI BURE, or BURÆUS (1578-1655), was a physician at the court of Gustavus Adolphus, but he was also much interested in mathematics and was one of the pioneers in mechanical computation.³¹

BALDASSARE CAPRA (d. 1626) was a practicing physician at Milan, but his interests were rather in mathematical astronomy.³² He was a bitter antagonist of Galileo.³³

FACIO CARDANO (1444-1524), professor of medicine and jurisprudence in Milan, edited Bishop Peckham's "Perspectiva communis." He was the father of Cardano the algebraist.

GIROLAMO CARDANO. See the article.

JOHANN CHESNECOPHERUS (1581-1635),

³⁰ "Annuli astronomici instrumenti . . . usus," Antverpiæ, 1553; "Arithmetices praxis" Lovanii, 1573.

³¹ "Arithmetica instrumentalis Abacus ab eo ipse inventus," Helmst., 1609.

³² "Considerazione astronomica sopra la nuova stella del 1604," Padova, 1605; "Tyrocinia astronomica," *ib.*, 1606; "De usu et fabrica circini cujusdam proportionis," *ib.*, 1607.

professor of medicine and anatomy at Upsala, gave much attention to astronomy and physics, and incidentally to mathematics.³⁴

FEDERIGO COMMANDINO (1509-1575), a physician, became mathematician to Duke Guido Ubaldi of Urbino and to Cardinal Ranuccio in Rome, but his greatest contributions were in his editions of the mathematical works of Ptolemy, Archimedes, Apollonius, Aristarchus, Euclid, Pappus, and Heron. These were published in Venice, Rome, Bologna, Pisa, and Urbino between 1558 and 1592. His edition of Euclid is particularly well known.

COPERNICUS. See the article.

JUAN BAPTISTA CURSA, born in Valencia in the second half of the sixteenth century, a doctor of medicine, wrote one work on mathematical astronomy.³⁵

JOACHIM CURTIUS (1585-1742), a practicing physician in Hamburg, edited Tycho Brahe's "Oratio de disciplinis mathematicis" (Hamb., 1621) and wrote "De certitudine matheseos et astronomiæ" (*ib.*, 1616).

CYRIAQUE DE MANGIN (c. 1570-1642), a Paris physician, published his "Problemata duo nobilissima, quorum nec analysin geometricam videntur tenuisse J. Regiomontanus et P. Nonius," etc., in Paris in 1616.

FEDERIGO DELFINO (1477-1547), a physician in Venice, became professor of astronomy in the University of Padua, his native town. His mathematical work is seen in his "Annotationes in Tabulas Alphonsinas."

JOSEPH SOLOMON DELMEDIGO (1591-1655), a native of Candia, a graduate of Padua, a student under Galileo, a cabalist in Constantinople, physician to Prince Rad-

³³ So we have Galileo's "Difese contra alle calunnie e imposture de Baldassare Capra," Venezia, 1607.

³⁴ E.g., in his "De stellis," and his "De eclipsi solis et lunæ," Upsala, 1624.

³⁵ "Discurso mathematico sobre la natvrazeza y significacion de los cometas . . . de 1618; Compuesto por el doctor Iuan Baptista Cursa, Philosopho y Medico Valenciano," Valencia, 1619.

ziwill at Vilna, a Rabbi at Hamburg, a physician in Amsterdam, and a prolific writer on medicine and mathematics.³⁶

JOHANN DRYANDER, or EICHMANN (1500–1560), was professor of medicine and mathematics at the University of Marburg (1535). He wrote several works on mathematical astronomy.

THADDÄUS DUNUS, or TADDEO DUNO (1523–1613), was a Zürich physician, born in Locarno, but he is known only for his two rather obscure mathematical works.³⁷

LORENZ EICHSTADT (1596–1660), professor of medicine and mathematics in the Gymnasium at Danzig, published several works on mathematical astronomy.

SAMUEL EISENMENGER, known also as Siderokrates (1534–1585), a practicing physician, was professor of mathematics at the University of Tübingen.³⁸

PAUL FABRICIUS (1529 or 1519–1588), a physician of high standing, a professor in the University of Vienna, was known chiefly for his mathematical tables for use in astronomy.³⁹

JEAN FERNEL. See the article.

AUGER FERRIER (1513–1588), physician to Catharine de Medici, queen of Henri II of France, was quite as much interested in mathematics and astrology as in medicine.⁴⁰

FIENUS, or FYENS (1567–1631), professor of medicine at Louvain, writer upon medical matters, was also known as an astronomer.⁴¹

³⁶ For example, the "Refuath Tealah" (Healing medicine); "Or Shibat Ha-yamim" (the Light of the Seven Days) including some discussion of optics; "Bosmat Bat Schelomoh" (Bosmat, daughter of Solomon), on mathematics and related subjects; and "Elim" (Amsterdam, 1629), a work containing answers to various scientific questions propounded by Zerakh ben Nathan and seventy mathematical paradoxes.

³⁷ "Arithmetices, practices methodus," Basileæ, 1546; "De nonis, idibus et calendis," *ib.*, 1546.

³⁸ "De usu partium cœli in commendationem astronomiæ," Argentorati, 1567.

THOMAS FINKE, or FINCK (1561–1656), was court physician to the Duke of Schleswig-Holstein, and afterward professor of medicine (1591), of mathematics (1602), and of rhetoric in the University of Copenhagen. His mathematical work also led him into the field of astronomy.⁴²

JACOB FLACH (1537–1611) was professor of medicine and of mathematics at the University of Jena, but he seems to have contributed nothing to the literature of either science.

ERASMUS FLOCK (1514–1568), a physician of Nürnberg, was for a short time (1543–1545) professor of philosophy and mathematics in the University of Wittenberg. Among his other activities he edited Ptolemy's "Almagest" (Norimb., 1550).

SIMON FORMAN (1552–1611), a physician and an astrologer in London and the author of various works on alchemy, magic, and astrology.

GERONIMO or GIROLAMO FRACASTORO (1483–1553), a physician in Verona, was afterwards Papal physician. He wrote on medicine, but also was interested in the mathematics of optics and seems to have had some idea of the telescope.⁴³

JEAN FRANCO (c. 1550–1610), a physician of Brussels, wrote an ephemeris of astrological character, in Flemish, and this was published at Antwerp in 1594.

LORENZ FRIES (c. 1485–1531), a prominent iatromathematician, author of the "*Spiegel der Arznei*" (1518) and of a work on the astrolabe. He remarks that "medi-

³⁹ "Tabulæ astronomicæ," Vienna, 1558.

⁴⁰ "De diebus decretoriis secundum Pythagoricam doctrinam et astronomicam observationem," Lugduni Batavorum, 1541.

⁴¹ "De cometa anni 1618," Antv., 1619.

⁴² "De constitutione philosophiæ mathematicæ," Hafniæ, 1591; "Geometriæ rotundi libri XIV," Basileæ, 1583; "De hypothesis astronomicis," etc., Hafniæ, 1593, etc.

⁴³ This is in his "Homocentricorum seu de stellis, liber unus," Venet., 1538.

cus sine astrorum cognitione perfectus esse non potest."

GALILEO. See the article.

GEMMA FRISIUS. See the article.

CORNELIS GEMMA FRISIUS (1535-1577), son of the better known Gemma Rainer (Gemma Frisius), was professor of medicine and also of astronomy at Louvain. His "*De arte cyclognomica tomi III, philosophiam Hippocratis, Galeni, Platonis et Aristotelis in unam methodi speciem referentes*" (Antv., 1569) is well known, and he also wrote two astronomical works.

SIMON GRYNÆUS the Younger (1539-1582) was professor of medicine and of mathematics at Heidelberg. His father published the first Greek edition of Ptolemy's "*Almagest*" (Basil., 1538), and was a friend of Luther and Melancthon. Simon the Younger wrote a work on astronomy,⁴⁴ published in Basle in 1580.

ISAAK HABRECHT (d. 1633) was a doctor of philosophy and of medicine. In his later years he became an assistant in mathematics in the University of Strasburg. He published various works of an astronomical nature.

THADDÆUS HAGEK (1525-1600), also known as Hajek, or Hagecius ab Hayck, and as Thaddæus Nemicus, was for a long time professor of mathematics in the Carolinum at Prague, but later was physician to Maximilian II and to Rudolph II. He wrote several works on geometry and astronomy.⁴⁵

MUHAMMED IBN IBRÂHÎM IBN JÛSUF, RADÎ ED-DÎN ABÛ 'ABDALLÂH (d. 1563), known as Ibn el-Hanbalî, a native of Aleppo, a man well versed in medicine, law, and mathematics, wrote various works on geometry and arithmetic.

JOHANN HARTMANN (1568-1631) was

⁴⁴ "De cometis dissertationes novæ."

⁴⁵ Among them, "*Oratio de laudibus geometriæ*," Prague, 1557; "*Apodoxis physica et mathematica de cometis tum in genere, tum imprimis de eo, qui 1580 . . . affulsit*," Görlicii, 1581.

professor of mathematics in the University of Marburg (1592) and later took his degree there in medicine (1606), then becoming professor of chemistry (of "*Chymia-trie*"). He was physician at the court of the Kurfürst of Hesse.⁴⁶

SIXTUS AB HEMMINGA (1533-1581) was a physician and mathematician of some prominence in Belgium. He studied in Gröningen, Cöln, Louvain, and Paris.⁴⁷

GEORG HENISCH (1549-1618), of Hungarian birth, was a physician and afterwards taught logic and mathematics at Augsburg. He wrote numerous works on mathematics,⁴⁸ philology, and medicine.

DAVID HERLICIVS (1557-1636), also known as Herlick and Herlitz, a physician, was professor of mathematics in the University of Greifswald from 1585 to 1598. He wrote upwards of fifty works, chiefly on astronomy.

JOACHIM JUNG (1587-1657), professor of mathematics at Giessen (1609-1614), of medicine at Padua (1618), of mathematics at Rostock (1624-1625), of medicine at Helmstädt (a few months), and again of mathematics at Rostock, alternated as few men do between his two favorite sciences. His writings cover a wide range, including mathematics,⁴⁹ astronomy, physics, and botany.

LILIO. See the article.

JOHANN MARCUS MARCI DE KRONLAND (1595-1667), for more than forty years professor of medicine at Prag, physician to Emperor Ferdinand III, wrote quite as much,

⁴⁶ His sole printed work on mathematics was his "*Disputatio elementorum geometricorum*," Cassel, 1600, but he wrote on medicine and chemistry.

⁴⁷ He wrote "*Astrologiæ ratione, et experientia refutatæ liber*," Antverpiæ, 1583.

⁴⁸ "De numeratione multiplici, vetere et recenti," Aug. Vind., 1605; "*Arithmetica perfecta et demonstrata*," *ib.*, 1605; "*Commentarius in sphaeram Procli*," *ib.*, 1609; and others.

⁴⁹ "*Geometria empirica*," Rostochii, 1627, with later editions; "*Disputatio de Stæcheosi geometrica*," Hamb., 1634.

in a somewhat heterodoxical fashion, on mathematics as on medicine.⁵⁰

PHILIPS VAN LANSBERG (1561-1652), a physician and priest at Antwerp and elsewhere, devoted his energies chiefly to mathematics⁵¹ and astronomy. His "Opera omnia" appeared at Middelburg in 1663.

WILHELM LAUREMBERG (1547-1612) was professor of mathematics and medicine at Rostock and wrote on both sciences.⁵²

PETER LAUREMBERG (1585-1639), son of Wilhelm, was even more versatile than his father, for he studied medicine in Leyden, was professor of philosophy in Montauban, of medicine in Montpellier, of physics and mathematics in Hamburg, and of poetry at Rostock. He wrote on astronomy, mathematics, physics, and various other disciplines, and his influence was what would be expected from one who scattered his energies so recklessly.

JOHANN WILHELM LAUREMBERG (1590-1658), a younger brother of Peter, divided his interests almost as disastrously. He received his doctor's degree in medicine at Rheims in 1616, was professor of poetry and mathematics at Rostock (1618) and of mathematics in the Ritteracademie at Soroe (1623). His writings were chiefly if not wholly mathematical, but not of a high character.⁵³

HEINRICH LAVATER (1560-1623), a physician, was professor of physics and mathematics in Zurich, the city of his birth. His writings were chiefly on physics and astronomy and were of no particular merit.

⁵⁰ For example, "De proportionē motus," Pragæ, 1639, "Deproportionē motus figurarum rectilinearum et circuli quadratura ex motu," *ib.*, 1648; "De longitudine s. differentia inter duos meridianos; una cum motu vero lunæ inveniēdo ad tempus datæ observationis," *ib.*, 1650; "Labyrinthus in quo via ad circuli quadraturam pluribus modis exhibetur," *ib.*, 1654.

⁵¹ "Triangulorum geometriæ, libri quatuor" Lugduni Batav., 1591 and Amstelod., 1631; "Cyclometriæ novæ libri duo," Middelb., 1616-1628.

⁵² Among other works he wrote a "Breviarium geometricum et geodæticum."

LEONARDO DA VINCI. See the article.

ADAM LONICERUS, or LONITZER (1528-1586), was professor of mathematics at Nürnberg in 1553 and the following year he received his doctor's degree in medicine at Mainz. He wrote on botany, medicine, and mathematics.⁵⁴

MANGIN. See Cyriaque de Mangin.

SIMON MARIUS, or MAYER (1570-1624), studied astronomy under Tycho Brahe and Kepler and then took a course in medicine at Padua. His contributions were all in the line of mathematics, including astronomy.⁵⁵

MAYER. See Marius.

METIUS. See the article.

CHRISTOPH MEURER (1558-1616), a member of the medical faculty and professor of mathematics at the University of Leipzig.⁵⁶

JACOB MILICH (1501-1559), or Milichius, professor of medicine in the University of Wittenberg, also taught mathematics there. His commentary on Pliny contains more or less of astronomy.

BURCKHARD MITHOB (1504-1565) was professor of mathematics and of medicine in the University of Marburg.⁵⁷

ANTOINE MIZAULD (c. 1520-1578), a practicing physician in Paris, wrote a number of works on mathematical astronomy.

HENRY DE MONANTHEUIL, or MONANTHOlius (1536-1606), professor of medicine (1574) and later (1585) of mathematics in the Collège royal of France, at Paris. He was a

⁵³ "Logarithmus," Lugduni Batav., 1628; "Lusus et recreationes ex fundamentis arithmetice," Havn., 1634; "Arithmetica et algebra," Soroe, 1643; "Instrumentum proportionum," etc. Rostochii.

⁵⁴ "Arithmetice brevis introductio," Francof., 1551.

⁵⁵ Among his works were "Die ersten sex Bücher elementorum Euclidis," Nürnberg, 1610; "Hypotheses de systemate mundi," 1596.

⁵⁶ He wrote "Analysis arithmetice et geometrie tabulis succinctis," Lipsiæ, 1607, and edited the arithmetic of Psellus and the optics and catoptrics of Euclid.

⁵⁷ He wrote "Annuli cum sphericis, tum mathematici usus et structura," Marp., 1536; "Stereometria," Francof., 1544.

pupil of Ramus's. He wrote various works on mathematics and iatromathematics.⁵⁸

JEAN BAPTISTE MORIN (1583-1656), physician to the Bishop of Boulogne and other notables, became professor of mathematics at the Collège royal in Paris in 1630. He was a voluminous writer, his interests including geology, astronomy, theology, astronomy, and mathematics.⁵⁹

JOANNES MORISOTUS, a physician of about the middle of the sixteenth century, wrote among other works four books on arithmetic.⁶⁰

JACOB MÜLLER (1594-1637) was professor of mathematics (1618) and of medicine (1620) in the University of Giessen, and later of both mathematics and medicine at Marburg. He wrote chiefly on mathematics.⁶¹

MÜLLER. See also Mulerius.

NICOLAUS MULERIUS (1564-1630), also known as Mulierius, Muliers, and Müller, a Dutch physician, was professor of mathematics at the University of Gröninge (1614-1621). He wrote a number of works on mathematical astronomy.

PIETER MULERIUS (1599-1647), son of the preceding, was a physician and became professor of physics and botany at Gröninge (1629). He wrote on mathematical astronomy, continuing the Ephemeris begun by his father.

MICHAEL NEANDER (1529-1581) was professor of mathematics and Greek (1551) in the University of Jena, and later (1560) professor of medicine.⁶²

NEMICUS. See Hagek.

⁵⁸ "Oratio pro mathematicis artibus," Parisiis, 1574; "Ludus iatromathematicus," *ib.*, 1597; "De puncto, primo geometriæ principio," Lugduni Bat., 1600, *etc.*

⁵⁹ "Trigonometriæ canonicæ libri tres," Parisiis, 1633.

⁶⁰ Heilbronner, "Historia Matheseos Universæ," Lipsiæ, 1742, p. 789, quoting Vossius.

⁶¹ "Compendium geometricum," Gissæ, 1620; "Praxis geometriæ universalis," *ib.*, 1621; "Arithmetices compendium," Lipsiæ, 1631.

GERARD DE NEUFVILLE (d. 1648), professor of mathematics and physics (1611) in the Gymnasium at Bremen, and later (1624) of medicine, wrote on mathematics,⁶³ astronomy, and physics.

AUGUSTINUS NIPHUS (1473-1546), a physician and astrologer in Suessa, Calabria, published in 1504, in Venice, an astrological work in which he endeavored to combine the observations of the physician with those of the astronomer.

ANTONIO NÚÑEZ DE ZAMORA, a native of Salamanca or Zamora, born in the second half of the sixteenth century, lectured at the University in that city on medicine, mathematics, and astrology.⁶⁴

PEDRO NÚÑEZ SALACIENSE (1492-1577) studied medicine in Lisbon, but gave his attention thereafter entirely to mathematics. He became one of the leading Portuguese mathematicians of the sixteenth century, writing several treatises of considerable merit.⁶⁵

HERMANN OBERMEYER (1588-1655), a Basle physician, became professor of mathematics in the University of Basle in 1630. His writings were astrological and astronomical and were of no value.

PELETIER. See the article.

KASPAR PEUCER (1525-1602) was professor of mathematics (1554) and then (1560) of medicine in the University of Wittenberg. His position as son-in-law of Melanchthon probably gave him more standing than would otherwise have been his.

⁶² His "Synopsis mensurarum et ponderum ponderationisque mensurabilium secundum Romanos, Athenienses," *etc.*, was published at Basle in 1555. He also wrote "Elementa sphericæ doctrinæ," *ib.*, 1561.

⁶³ "Arithmetica theoretica et practica," Bremæ, 1624.

⁶⁴ He published two works, the first being "Prognostico del eclipse del sol que se hizo en año de 1600," Salamanca, 1600.

⁶⁵ Among them, "Libro de algebra en Arithmetica y Geometria," Amberes, 1564-1567; "Tratado de sphaera," Lisboa, 1537.

He was also physician at one of the small courts. He wrote various works on medicine and mathematical astronomy.⁶⁶

JUAN MARTÍN POBLACIÓN, a native of Valencia, took high rank as a physician and astrologer in the sixteenth century. He wrote two works on the astrolabe, one of which exists only in manuscript.⁶⁷

CRISTÓBAL PONCE DE LEÓN (d. 1598) was professor of medicine and also of mathematics in Alcalá.⁶⁸

RAINER OR RAINIER. See Gemma Frisius in the article.

RECORDE. See the article.

REGNIER. See Gemma Frisius in the article.

AMBROSIUS RHODIUS (1577-1633), professor of mathematics in the University of Wittenberg (1608) and author of various works on optics, astronomy, and geometry,⁶⁹ gave also much attention to medicine. There seems to have been another of the same name, a contemporary, who was also interested in medicine and mathematics.

GIOVANNI ANTONIO ROFFENI (d. 1643), a doctor of medicine, became professor of mathematics in Bologna, but his works were astronomical and astrological only.⁷⁰

ADRIAEN VAN ROOMEN. See the article.

⁶⁶ Among the latter, "*Elementa doctrinæ de circulis cœlestibus et primo motu*," Viteb., 1551, with various editions; "*De dimensione terræ et geometrice numerandis locorum particularium intervallis ex doctrina triangulorum sphericorum*," *ib.*, 1554, with later editions.

⁶⁷ The published work was entitled "*De vsu astrolabi*," and appeared in Paris in 1526 and 1527, later editions in 1546, 1547, 1550, 1553, 1554, and 1556. The unpublished manuscript is a "*Tratado y uso del astrolabio*" and is in the Biblioteca Nacional at Madrid.

⁶⁸ He wrote "*Libro de la ciencia natural del cielo*," Alcalá, 1598.

⁶⁹ "*Euclidis elementorum libri XIII*," Viteb., 1609, 1634.

⁷⁰ "*Contra cæcam cujusdam Martini Horckii*," Bononiæ, 1611; "*De laudibus veræ astrologiæ*," *ib.*, 1614.

PETER RYFF (1552-1629) was a practicing physician in Basle and became professor of mathematics (1586) in the university. He wrote several works on mathematics.⁷¹

FRANCISCO SÁNCHEZ (1550-1623), born at Tuy in the diocese of Braga, a Spanish physician, lived for some time in Montpellier where he was engaged in the practice of his profession, finally settling in Tolosa. He wrote one work on mathematics⁷² and one on astronomy. He should not be confused with the great humanist of the same name, who was born at Brozas in 1523.

GIUSEPPE SCALA (1556-1585), a Sicilian physician, composed a set of astronomical tables which was published four years after his death.⁷³

VICTORIN SCHÖNFELD (1525-1591) received the degree of doctor of medicine at Marburg in 1557, became professor of mathematics in the same university in 1557, and in 1566 became professor of medicine. He wrote on medicine, mathematics, and astrology.⁷⁴

JACOB SCHÖNHEINZ, one of the earliest iatromathematicians of Germany, and the earliest in the sixteenth century, published his "*Apologia astrologiæ*," at Nürnberg, in 1502.

JOHANN SCHRÖTER (1513-1593), a Viennese practitioner, physician to the Imperial and Saxon courts, wrote various mathematical works.⁷⁵

MIGUEL SERVETO (c. 1511-1553), one of

⁷¹ Among them, "*Questiones geometricæ in Euclidis elementa*," Francof., 1600; "*Compendium arithmeticæ Vrstisii*," Oxoniæ, 1626; "*Elementa sphaera mundi*," *ib.*, 1627.

⁷² "*Objectiones & erotemata super Geometricas Euclides demonstrationes ad Christophorum Clavius*."

⁷³ "*Ephemerides ex tabulis Magini*," Venetiis, 1589.

⁷⁴ Among his works are a treatise on epilepsy (Marburg, 1577) and the "*Prognosticon astrologicum*," which appeared for various years.

⁷⁵ Among them, "*De arte numerandi*."

the best educated young men of Spain in the sixteenth century, well trained in Latin, Greek, Hebrew, philosophy, theology, mathematics, and medicine, fell under the ban of the authorities because of his opinions and was executed in his forty-fourth year. He wrote on geography and astrology.⁷⁶

OLAUS MARTIN STEN (1598-1650) was professor of astronomy, physics, and medicine at the University of Upsala.

GEORG TANSTETTER VON THANNAU (1482-1535) was physician to the Emperor Maximilian I, and became professor of astronomy in the University of Vienna. He edited Peurbach's "Tabulæ eclipsium," Regiomontanus's "Tabulæ primi mobilis," Proclus's "Libellum de sphæra," and

⁷⁶ "Apologetica disceptatio pro astrologia."

the works of Albertus Magnus, Vienna 1523.

JERÓNIMO TORELLA, a physician to Ferdinand the Catholic, to Juana of Naples, and to other dignitaries in the sixteenth century, was much interested in astrology and wrote two works on the subject.

BARTOLOMÉ DEL VALLE, a doctor of medicine in Salamanca, wrote two treatises on astrology, published in 1619.

VESPASIANO JERÓNIMO DE VARGAS Y HEREDIA, a physician and mathematician, published a "Tratado de cometas" in Granada in 1619.

VICTORIANO ZARAGOZANA (1545-1602), a Spanish physician, was much interested in the mathematics of astronomy, and wrote several works on the subject, all printed at Zaragoza, 1583-1599.

STRUCTURE FOLLOWS FUNCTION

Thus man is the most intelligent of all animals, thus the hands are proper instruments for an intelligent being, since man is not wiser than the animals because he has hands (as Anaxagoras maintains), but as the judicious Aristotle asserts, he has hands precisely because he is the wisest. It is not by means of his hands, in fact, but through his reason that man learned the arts: the hands are an instrument like the lyre to the musician, like the tongs to a blacksmith. . . If we examine newly-born creatures that strive to act before the parts of the body are fully formed, it becomes clear that it is not the parts of the body which excite the soul to be cowardly, courageous or wise. For example, I have often

seen a calf try to gore before its horns had developed, a chicken try to spur although its feet were soft, and a little pig trying to defend itself with its snout, although it had no tusks; even a little dog trying to bite without teeth; for every animal has in himself, without any previous instruction, an instinctive feeling of the faculties and functions of his body. . . It is not through instruction, I opine, that the eagle soars, the duck swims and the snake glides into a hole, for as Hippocrates says: Animal natures are untaught. Whence it seems to me, for the rest, that animals practice certain arts more by instinct than through reason.

Galen De usu partium, 1, 3.

HISTORICAL DEVELOPMENT OF OUR KNOWLEDGE OF THE CIRCULATION AND ITS DISORDERS¹

By PHILIP S. ROY, M.D.

WASHINGTON, D. C.

THE earliest account of the structure of the heart is that contained in the Hippocratic writings. It is probably pseudo-Hippocratic, but admittedly a work of great antiquity. The heart is described as a strong muscle; the pericardium as a smooth tunic, containing a little fluid resembling urine; the auricles, the ventricles, the sigmoid valves and the origin of the veins from the heart are mentioned. The heart is described as the fountain-head irrigating all parts of the body, and the left ventricle is held to be the seat of understanding.

The first great master dealing with the circulation of whom we have a record is Aristotle, and we constantly find Harvey referring to him in his great work. Indeed, Harvey's mind seems to have been so impressed by the great masters of antiquity that in his old age he bade a young student, "Go to the fountain-head and read Aristotle, Cicero and Avicenna."

From John G. Curtis's great book, "Harvey's Views on the Use of the Circulation of the Blood," we learn in concise language what Aristotle knew of the circulation.

"When an ancient observer looked with the naked eye at the very early embryo of the fowl, he distinguished at first only a blood-red point, which pulsated, or 'leapt.' This, Aristotle judged to be the heart containing blood, before any blood-vessel had shown itself and before blood was visible in any other part. Very soon, however, two vessels containing

blood were seen, according to him, to extend from the rudimentary heart towards the periphery. From these and other considerations, Aristotle inferred that both the blood and all its containing vessels owe their first origin to the heart; and that throughout life the liquid made elsewhere from the food, enters the heart, there to be perfected into blood by the action of the vital innate heat, of which, as we have seen, he held the fiery central hearth to be within the heart. Naturally, therefore, he believed the blood not to be hot of itself, but to acquire its vivifying heat at the heart, the pulsation of which he held to be caused directly by the seething of the blood within. When thus perfected and charged with heat, the blood, according to him, is distributed from the heart through the vena cava as well as the aorta. These great vessels and their subdivisions, Aristotle distinguished anatomically, but he made no serious physiological distinction between what we call the veins and the arteries; and, himself, applied the word "artery" to the windpipe only. As to the cavities and contents of the heart, even as to the number of its cavities, he had obscure, complex, and erroneous ideas, and of the valves he knew nothing. He recognized no essential differences between the matters distributed by way of the vena cava and by way of the aorta, all being, alike, one thing,—blood; though the blood was hotter or cooler, thinner or thicker, purer or cruder, in different regions or parts of the body, in different sets of vessels, in different cavi-

¹ Read to the Medical History Club of Washington, D. C., January 27, 1917.

ties of the heart, or at different times, in the same place."²

Aristotle, like Plato, knowing nothing of the nerves, judges the blood-vessels to be sensory paths; and blood-vessels connect, not only the sensitive flesh, but all the most special sense organs, with the heart. Such is an outline of the reasons why Aristotle held the heart to be the life-long seat, not only of the "nutritive soul" but of the "sensory soul" as well. During the Alexandrian period, Erasistratus (300 B.C.) recognized the valves, both arterial and auricular, and believed that they ventilated the heart. This was more than four centuries before Galen and more than nineteen centuries before Harvey.

Passing from Aristotle to the next great period of medicine, we learn from Curtis the views that Galen held about the heart, blood-vessels and the circulating blood.

"According to the more detailed views of Galen and his school, the blood was perfected and had its central source not in the heart but in the liver, to which the portal vein brought a cruder liquid derived from the products of digestion. In the liver, the veins also originated, while the arteries originated at the heart. The blood left its source in the liver, by way of the roots of the venous system, that is, by the hepatic veins of modern anatomy. From these it entered the great venous trunk, the vena cava, a vessel which comprised the inferior vena cava, the right auricle, and the superior vena cava of our present nomenclature. Upon leaving the liver, the blood at once divided into two sharply diverging streams, one flowing directly downward through the vena cava, the belly, and the lower extremity; the other flowing directly upward through the vena cava to the chest, the upper extremities, and the head.

² J. G. Curtis: "Harvey's Views on the Use of the Circulation of the Blood," New York, 1915, 48.

Therefore, that part of the vena cava which we call the right auricle simply formed a part of the upward pathway of the blood, at a place where some of the blood left its upward pathway and flowed through a side opening into the right ventricle. Of the fraction of the blood that entered the right ventricle, a part went to the lungs simply for their nutrition, by the "arterial vein"—the pulmonary artery of modern parlance—and a part percolated in a refined condition through the pores of the septum, from the right ventricle to the left, to be worked up there with the vital spirits and thus become the basis of the spirituous blood of the arteries. From the left ventricle, this spirituous blood went to the body at large by way of the arteries. There is no evidence that Galen believed any blood to pass from the right to the left ventricle otherwise than through the pores of the septum. As he says, however, the branches of the 'venous artery' (our pulmonary vein) 'transmit thin and pure and vaporous blood in abundance' to the lungs for their nutrition, we may infer that he held this supply to be derived from the left ventricle, like that of the rest of the body."³

Galen seems to have been the first writer who positively proved that the blood-vessels, both veins and arteries, carry blood.

Galen had maintained that the blood passes from the right to the left ventricle by means of certain hypothetical, invisible "pores." Vesalius, in 1543, treated this statement in a skeptical or half-credulous manner. Servetus, in 1553, reasoned that the blood is mixed with air from the lungs before passing into the heart. Columbus, in 1559, showed, in his vivisections of animals, that the pulmonary veins contain blood, denied the existence of Galen's pores, and also held that the blood is cooled and

³ Curtis: *op. cit.*, 56-58.

rendered spirituous by mixture with air in the lungs. Sir Michael Foster and others maintain that Columbus derived his knowledge from the works of Servetus, and that the honor of discovering the pulmonary circulation belongs to Servetus and not to Columbus.

The circulation was but dimly understood by physiologists until William Harvey on his fiftieth birthday, 1628, in a master-stroke, gave to the world a treatise which he entitled "An Anatomical Dissertation Upon the Movements of the Heart and Blood-vessels in Animals." We can not help regretting that Harvey did not dedicate this great work to a great man, but we find it dedicated to Charles I, and this dedication concluding with the following words:

"Accept, therefore, I most humbly beseech you, most serene King, with your wanton kindness and forbearance, this, my new treatise upon the heart—you who are yourself the new light of this age and indeed its true heart, a prince abounding with virtue and grace, to whom we will gladly refer all the blessings which England enjoys, all the pleasures in our lives."

Aristotle established what Curtis calls "The primacy of the heart," regarding it as the seat of life and the soul, the hearth of animal heat. Harvey gave this primacy to the blood and viewed the heart as only a force-pump to keep the blood in motion.

It would not be possible in the length of this paper to give all of Harvey's dissertation on the circulation of the blood, proving that it is "a movement, as it were, in a circle." Harvey said he became convinced that "the veins on the one hand would become drained, and the arteries on the other ruptured through excessive charge of blood unless the blood should somehow find its way from the arteries into the veins and so return to the right side of the heart." He continues,

"I finally saw that the blood, forced by the action of the left ventricle into

the arteries, was distributed to the body at large and its several parts, in the same manner as it is sent through the lungs, impelled by the right ventricle into the pulmonary artery; and that it then passed through the veins and along the vena cava, and so round to the left ventricle in the manner already indicated. And similarly does it come to pass in the body, through the movement of the blood, that the various parts are nourished, cherished, quickened by the warmer, more perfect, vaporous, spirituous, and, I may say, alimentive blood; which, on the other hand, owing to its contact with these parts, becomes cooled, coagulated, and, so to speak, effete. It then returns to its sovereign, the heart, as if to its source, or to the inmost home of the body, there to recover its state of excellence or perfection. Here it renews its fluidity, natural heat, and becomes powerful, fervid, a kind of treasure of life, impregnated with spirits, it might be said with balsam."

Harvey then proceeds with mathematical precision to demonstrate his circulation theory. He says:

"Let us assume, either arbitrarily or from experiment, the quantity of blood which the left ventricle of the heart will contain when distended, to be, say two ounces, three ounces, or one ounce and a half—in the dead body I have found it to hold upwards of two ounces. Let us assume further, how much less the heart will hold in the contracted state than in the dilated state; and how much blood it will project into the aorta upon each contraction;—and all the world allows that with the systole something is always projected; a necessary consequence, and obvious from the structure of the valves; and let us suppose as approaching the truth, that the fourth or fifth or sixth, or even the eighth part of its charge is thrown into the artery at each contrac-

tion; this would give either half an ounce, or three drachms, or one drachm of blood, as propelled by the heart at each pulse into the aorta; which quantity, by reason of the valves at the root of the vessel, can by no means return to the ventricle. Now in the course of half an hour, the heart will have made more than one thousand beats, in some as many as two, three, or even four thousand. Multiplying the number of drachms propelled by the number of pulses, we shall have either one thousand half-ounces, or one thousand times three drachms, or a like proportional quantity of blood, according to the amount which we assume as propelled with each stroke of the heart, sent from this organ into the artery; a larger quantity in every case than is contained in the whole body! Upon this supposition, therefore, assumed merely as a ground for reasoning, we see the whole mass of blood passing through the heart from the veins to the arteries, and in like manner, through the lungs. But let it be said that this does not take place in half an hour, but in an hour, or even in a day; anyway it is still manifest that more blood passes through the heart in consequence of its action, than can either be supplied by the whole of the ingesta, or than can be contained in the veins at the same moment."

If Harvey had expressed these facts in terms of algebra, the scientific world would have soon come around to our own view that his experiments led him to a mathematical or quantitative *demonstration* of the circulation.⁴ But Smith shows that the plus and minus signs were first introduced in the arithmetic of the Bohemian physician Johann Widman (1489),⁵ and Cajori tells us⁶ that these did not come into general use before the time of Vieta (1540-1603),

who also popularized the use of letters to denote algebraic quantities. The sign of equality was devised by Robert Recorde in "The Whetstone of Witte" (1557), the first English treatise on algebra; the sign of division was not employed in England before 1668, and the sign of inequality much later.

In 1640, Harvey's discovery was given a hydrodynamic proof in the celebrated "experiment of Walæus," viz., that incision in a ligated femoral vein causes the blood to spurt in streams from the distal opening and to ooze in drops from the proximal opening.

In 1660, Malpighi demonstrated the capillary circulation. Of his discovery of the capillaries, Fraser Harris has well said, "Harvey made their existence a logical necessity, Malpighi made it a histological certainty."

ANATOMY AND PHYSIOLOGY

Leonardo da Vinci made the most accurate and beautiful drawings of cardiac structure of his time. As with Henle, many of his drawings are architectural in character, bringing out the idea of plan and elevation. The valves are drawn from many angles, from above downwards and otherwise, and their relations in three dimensions are clearly shown. In one drawing, the whole valve is dissected from the underlying muscle and unrolled in a single plane, showing its finer structure in a sort of Mercator's projection (Arnold Klebs).⁷ Leonardo understood clearly that "the heart is a muscle, the first in strength and the most potential among the other muscles." His drawings and physiological investigations of the heart were far superior to those of Vesalius. He was the first to delineate the muscular bands which pass from the ventricular walls to the septum, now

⁴ F. Cajori: "History of Mathematics," New York, 1897, 150-151.

⁷ A. C. Klebs: *Boston Med. & Surg. Jour.*, 1916, CLXXV, 1; 45, with many illustrations.

⁴ Garrison: "History of Medicine," Phila., 2 ed., 1917, 234.

⁵ Smith: "Rara Arithmetica," Boston, 1908, 39.

described as "moderator bands," structures which contain branches of the auriculo-ventricular bundle of His.

In 1733, Stephen Hales, an English clergyman, invented the first manometer or tonometer—a long glass tube fastened inside a horse's artery; and with this rude instrument made the first measurements of blood pressure in connection with the capacity of the heart and the velocity of the blood current.⁸ The next step was taken by Poiseuille, who in 1828 invented the hemodynamometer, with which he showed the relation of blood pressure to respiration, and measured the degree of arterial dilatation at each heart beat. In 1847 Carl Ludwig connected Poiseuille's instrument with a revolving cylinder and thus invented the kymograph and introduced the graphic method into physiology. In 1840 Poiseuille stated the celebrated mathematical law or formula for estimating the viscosity of the blood and invented the viscosimeter for this purpose. The inhibitory power of the vagus nerve was discovered by the Weber brothers in 1845, but, in 1870-71, Ludwig and Schmiedeberg showed that the vagus contains accelerator as well as inhibitory fibers. Nearly all our recent knowledge of the physiology of the circulation came originally from the laboratory of Ludwig, who was once defined as "the only physiologist who ever did anything." He invented the graphic method, the kymograph, the blood pump and the *Stromuhr* or blood current clock, and devised the method of perfusion of excised organs, which has played such a prominent part in physiological experimentation up to the time of Carrel. In 1848, Ludwig discovered the ganglionic cells in the auricular septum. In 1850, with Noll, he showed that the lymph is produced by the diffusion of fluids from the blood through the walls of the capillary vessels into the surrounding tissues. In 1857-8,

with Lothar Meyer, he investigated the gases of the blood. In 1866, with Cyon, he investigated the effect of temperature on the heart beat, discovered the depressor nerve of the heart and the erector nerves of the peripheral vessels. In 1867, with Dogiel, he measured the movement of blood passing in a unit of time, by means of the current-clock (*Stromuhr*). In 1869-70, he had Brunton and Schmiedeberg study the effects of drugs upon the circulation, which was the starting point of the pharmacological careers of these two distinguished men. In 1871, his pupil, Bowditch of Boston, deduced "the all or nothing law," viz., that the heart muscle will always give a maximal contraction, or none at all. In the same year Kronecker showed that the heart muscle can not be tetanized. In 1871-73, with Dittmar, Ludwig located the vasomotor center in the medulla. In 1875, with von Kries, he measured the blood pressure in the capillaries. In 1880, with Schmidt Mülheim, he inaugurated the study of the effect of the injection of peptones into the blood. In 1883, his pupil Wooldridge began the study of the chemistry of coagulation of the blood. In 1884, another pupil, Gompertz, studied the arrangement of the muscular fibers in the heart.⁹

The most important work of recent times on the physiology of the circulation is that of Gaskell, who, in 1882-85, investigated the vasomotor nerves of the blood vessels, in Ludwig's laboratory. This research was the starting point of Gaskell's great work on the vagus nerve, which he showed to be quiescent rather than inhibitory in its effects upon the heart. The researches of Gaskell and Engelmann brought out the important fact that the heart muscle is autonomous and automatic in its action, its contractions being regulated to some extent by the nerves but not caused by them. Gaskell invented the term heart-block, pro-

⁸ Garrison: "History of Medicine," 2 ed., Phila., 1917, 317.

⁹ Garrison: "History of Medicine," 2 ed., Phila., 1917, 590-591.

duced it experimentally and explained its causes. Around the name of Gaskell we naturally group Waller, Kent, Keith and Flack, His and Tawara. It was Gaskell who explained the significance of the celebrated "experiment of Stannius," viz., that a ligature at the junction of the auricle and the sinus venosus will stop the heart, while a second ligature applied to the auriculo-ventricular groove will cause the ventricle to beat again. By means of the polygraph and the string galvanometer Sir James Mackenzie, Thomas Lewis and other clinicians have made many obscure diseases of the heart stand out as individualities. Cushny used electrocardiograms in checking up the effects of digitalis, and it is now well recognized that this drug is a positive danger in certain conditions of the heart. Among these may be mentioned angina pectoris, due to changes in the coronary arteries, and heart-block, unless complete.

The elucidation of the vasomotor mechanism was one of the great triumphs of Claude Bernard (1851-3). The anatomical studies of the heart's innervation were made by Henle (1841), by Bidder who discovered the ganglionic cells at the auriculo-ventricular juncture (1852), and by Bezold who demonstrated the accelerator nerves and their origin in the spinal cord. The sphygmograph was invented by Marey (1860).

The first correct investigation of the true nature of coagulation of the blood was made by William Hewson in 1771. He showed that, when coagulation is delayed by chemical means, coagulable plasma can be separated from the corpuscles and skimmed off, and that this contains an insoluble "coagulable lymph," which is our present fibrinogen. This discovery was confirmed by Andrew Buchanan, who extracted fibrin ferment in 1845. This name was given to the substance by Alexander Schmidt, who supposed that coagulation was due to the combination of fibrinogen and serum globulin. This error was cor-

rected by Hammaersten, who showed that coagulation is caused by the splitting up of the fibrinogen and other substances (1875). The rôle of the hormones, antithrombin and thromboplastin, in the coagulation of the blood, was investigated by Howell of Baltimore in 1911 and subsequently. Howell has also investigated the effect of increased venous pressure of the heart (1881), the life history of the blood corpuscles (1890), and other problems connected with the circulation. His teacher, Newell Martin, also specialized in the circulation, and studied the effect of variations of blood pressure and temperature upon the rate of heart beat. Two other American physiologists, Stewart of Cleveland, and Porter of Harvard, have also made extensive investigations in the circulation. In 1880, Sidney Ringer of Norwich, England, began to experiment with the effects of mixtures of the chlorids of sodium, potassium, calcium and magnesium in keeping the heart beating outside the body for a long period of time. These experiments evolved the ideal Ringer's "solution" for this purpose, and showed the importance of calcium salts in the maintenance of tissue activity, and gave Carrel the means for his remarkable work in experimental surgery, in particular his investigations of the latent life of arteries (1910), the preservation of portions of blood-vessels in cold storage for long periods before using them in transplantation, and the vast improvements in the surgery of the vascular system which resulted from this technic.

HEART SOUNDS ¹⁰

Harvey thought that the ebullition of hot blood distends the auricle, and that the distention of the ventricle through con-

¹⁰ The history of the heart sounds has been investigated by G. Joseph in the older *Janus* (Gotha, 1853, II, 1; 345; 565) and latterly by Leonard Hill in Schäfer's "Text-Book of Physiology," Edinb. & Lond., 1900, II, 28-33.

traction of the auricle causes the heart-beat. He said further that, "When there is the delivery of a quantity of blood from the veins to the arteries, a pulse takes place and can be heard within the chest." He compared this sound to the noise made by a horse swallowing. This view was naturally opposed by all the opponents of Harvey's theory of the circulation, and one of these, Æmilius Parisanus, a Venetian physician, declared that the sound described could not be heard at all, or at least "only in London." Lancisi, Senac, Haller and others refer to a *pulsus cordis*, however, which could be heard as well as felt, but even Corvisart made no distinction whatever between the sound and the impulse, since he only approached his ear to the chest when he could not sufficiently distinguish the beats by laying his hand upon the thorax. Laënnec was the first to note that the heart sounds can be heard in the vicinity of the heart, that there are two successive sounds, the first dull and longer, the second shrill and shorter, separated by a momentary rest, in the musical sense of the term. He ascribed the first sound to the ventricular contraction, the second to the auricular contraction, and he compared the latter to the sound made by a dog in lapping up water.¹¹ In 1829, A. Turner pointed out that the second sound occurred not at the end but at the beginning of the diastolic pause, and hence could not be derived from the auricular systole.¹² From this date, a perfect flood of opinions and controversies arose as to the cause of the heart sounds. Corrigan, Burdach, Magendie, Piorry, C. J. B. Williams, Bouillaud, Skoda, Cruveilhier, Barth, Roger, Purkinje, Valentin, Hamernik, Canstatt—to mention only a few outstanding names—all ventilated opinions more or less erroneous. Dun-

glison, in 1856, tabulated the views expressed up to his time in order to show what bewildering discordance of opinion existed.¹³ Sandborg,¹⁴ in 1881, tabulated no less than forty different theories. Before the time of Skoda, the French clinicians made no distinction whatever between heart sounds and heart murmurs, describing either indifferently as "*bruit*." Skoda cleared up much obscurity by making a clean-cut distinction between a "sound" and a "murmur." C. J. B. Williams, in 1836, showed that the first sound can be heard in the excised heart, even if the auriculoventricular valves be held open with the fingers.¹⁵ Ludwig and Dogiel, in 1868, found that the first sound continued, almost unaltered, after successive ligation of the venæ cavæ, the pulmonary artery and vein, and the aorta.¹⁶ This experiment entirely overthrew the view that the first sound was of simple valvular origin. Schaefer says that the valves can be held back by hooks or the finger, yet a systolic sound continues. A large number of physiological experiments of this kind produced the most conflicting views as to the origin of the first heart sound, but the difficulty was settled when Einthoven and Geluk, in 1894,¹⁷ registered the effect of the heart sounds on a microphone circuit, by means of a capillary electrometer; the movements of the electrometer being photographed on a moving sensitized plate. These photographs showed clearly that the sounds are compounded of several tones, each sound giving rise to a succession of vibrations of the mercury

¹³ Dunglison: "Human Physiology," Phila., 1856, I, 140. (Leonard Hill.)

¹⁴ Sandborg: "Résumé des études sur les bruits du cœur," Christiania, 1881, 6 (Leonard Hill).

¹⁵ Williams: *Rep. Brit. Ass. Adv. Sc.*, Lond., 1836, 269 (Leonard Hill).

¹⁶ Ludwig and Dogiel: *Ber. d. k. sächs. Gesellsch. d. Wissensch. Math.-Nat. Cl.*, Leipz., 1868, XX, 89 (Leonard Hill).

¹⁷ Einthoven and Geluk: *Arch. f. d. ges. Physiol.*, Bonn, 1894, LVII, 617 (Leonard Hill).

¹¹ Laënnec: "De l'auscultation médiate," Paris, 1819, II, 210. Cited by Leonard Hill.

¹² Turner: *Tr. Med.-Chir. Soc.*, Edinb., 1829, 226. Cited by Leonard Hill.

meniscus. The same method has been applied to the second sound of the heart, and the conclusion is that neither sound is simple, but each is formed of many component tones caused by the sudden tension and vibration of the cardiac muscles of the auriculoventricular valves, and of the blood, augmented by the stroke of the heart beating against the chest wall. The constituent tones of the second sound of the heart arise from vibrations of the valves and of the blood columns and the arterial walls.

A third sound of the heart was noted by E. Barié in 1893, again by A. S. Hirschfelder (1907), and elucidated by Einthoven, A. J. Gibson and William S. Thayer in 1907.

CLINICAL AND PATHOLOGICAL INVESTIGATIONS¹⁸

Up to the time of Hippocrates (460-377 B.C.) it was held that the heart could not be diseased. Herophilus and Erasistratus, of the Alexandrian school (300 B.C.), showed the synchronism of the pulse and the heart beat, and likened the heart to a pump. Galen (131-210 A.D.) expanded the pump analogy, showed that the arteries contained blood, not air, and made special experiments to demonstrate the motor power of the heart.

Areteaus says: "If the heart suffers primarily, death is not far off." In Celsus appears, for the first time, a mysterious disorder called by the Greeks *kardiakon*, and by the Romans *Cardiacus* or *Morbus Cardiacus*. This consisted of an indefinable and incoördinated group of symptoms—profuse sweating, fever with thin, weak pulse and short, panting respiration, great bodily weakness with cold extremities—variously attributed to the heart or stomach. Areteaus calls it "syncope" and regards it

as a definite cardiac affection. Galen regards it as a general weakening disease affecting both heart and stomach. Alexander Trallianus and Aetius, the last to mention it, describe it as a *gastric* disorder. The treatment was roborant, and wine the universal remedy, in all the old authors. After Alexander Trallianus (6th century B.C.) all trace of it disappears for six centuries. Huxham thought it a nervous fever with colliquative sweating and chills. Bonet describes a case (from Zacutus Lusitanus) of syncope cardiaca from a worm or polyp in the heart. Hecker, in his treatise on the English sweating sickness (1834) regards it as an analogue of this disease (miliary fever). In 1835, Seidlitz, of St. Petersburg, identified it with "exudative pericarditis." Landsberg, in his study of 1847, regards it as a secondary anemia. The symptoms he enumerates also bear some resemblance to those of leukemia.¹⁹ At all events, it was not an idiopathic disease of the heart.

In 1555, Vesalius diagnosed aortic aneurism of the abdominal and thoracic aorta in the living, and proved by opening the chest of a strapped animal that a quiescent heart may be resuscitated by the use of bellows. In 1534 Massa described cardiac dilatation and hypertrophy as aneurism. In 1679, Bonet described fatty infiltration or degeneration of the heart muscle. In 1672, Vieussens surmised that heart disease was the cause of most of the symptoms which the physicians of his day grouped as hydrothorax or otherwise described as asthma, palpitation, etc. In 1673 he noted dropsy of the pericardium, again in 1675 (with autopsies), and a little later, a case of pericarditis (with autopsy). In 1685, Vieussens noted a case of stenosis of the left ostium with disease of the mitral valve, and hypertrophy of the heart. The quality of the pulse was "small, weak and entirely irregular." This description of the pulse of mitral stenosis is classic. These contributions are all con-

¹⁸ See the historical sketches in Ziemssen's *Cyclopedia of the Practice of Medicine*, N. Y., 1876, VI, *passim*.

¹⁹ Landsberg: *Janus*, Breslau, 1847, II, 53-124.

tained in his treatise of 1715.²⁰ In 1695 he described a case of aortic regurgitation which remained unnoticed until the time of Hodgkin and Corrigan.²¹ Albertini was the first to employ palpitation in order to ascertain the cardiac impulse. In 1707, Lancisi associated asthma with cardiac disease, saw hypertrophy and dilatation as a common cause of sudden death, and described palpitation, difficult respiration and other symptoms of the disorder; also described aneurism due to syphilis. He indicated the turgescence of the veins of the neck as a characteristic symptom of hypertrophy of the left ventricle, which is not necessarily true.²² In 1761, Auenbrugger introduced percussion in diagnosis, which was taken up by Corvisart (1818) and extensively employed in the diagnosis of heart disease. Auenbrugger in his book on percussion pointed out the increased areas of dullness in pericardial effusion and cardiac hypertrophy (1761). Corvisart in his revival of Auenbrugger's method diagnosed pericarditis and separated hypertrophies from dilatations by percussion.

The first definite treatise on disease of the heart was that of Senac (1749) which was followed by the splendid books of Corvisart (1818), Laënnec (1819-26), James Hope (1832), Bouillaud (1835), and Stokes (1854). The invention of the stethoscope by Laënnec in 1819 revolutionized the diagnosis of diseases of the chest, including cardiac disorders, as shown in the first edition of his work (1819). The second edition (1823) is not only the greatest work on thoracic diseases ever written, but also a wonderful collection of original descriptions of new diseases. Hypertrophy and dilatation of the heart were referred to in Senac's treatise (1749). Endocarditis is

mainly associated with the great name of Bouillaud,²³ who introduced the term, and to whom we owe our fundamental knowledge of the condition. He showed the relation between endocarditis and acute articular rheumatism, sepsis and anemia; also its relation to valvular lesions and its occurrence after the development of such lesions; also the frequent complication of myocarditis with endocarditis and pericarditis. Virchow investigated the pathological histology of carditis (1856-62), and bacteriology made it possible to investigate the causes of the mycotic and malignant forms of the disease. Albertini (1661-1738) showed that the left ventricle is prone to hypertrophy, the right ventricle to dilatation. Auenbrugger, and after him Corvisart, applied the term aneurism to hypertrophy and dilatation. The two conditions were first distinguished by Laënnec and Bertin. Bright first noted enlargement of the heart in renal disease (1827) and Traube (1856) investigated it in detail.

Atrophy of the heart was first described by Senac (1749). Laënnec (1819) regarded it as a secondary disease. Bouillaud (1835) divided it into the simple, eccentric and concentric varieties.

Benivieni first noted induration of the heart (1529). Rota (1555), Massa (1559), and Fernelius (1656) described "ulcers of the heart." In 1761 Morgagni gave detailed accounts of inflammation, induration, ulcers, and rupture. Senac (1749) pointed out the base of the heart as the frequent site of abscess and induration, and assigned adjacent disease (pericarditis) as the cause. Laënnec (1819) studied myocarditis very closely, and first described true fatty degeneration, and external deposits of fat causing atrophy of the muscular substance

²⁰ Vieussens: "Traité nouveau de la structure et des causes du mouvement naturel du cœur," Paris, 1715.

²¹ J. J. Philipp: *Janus*, 1847, II, 582-598.

²² *Ibid.*, 1848, III, 316-326.

²³ See the "Historic Notes" of Th. von Jürgensen in his memoir on endocarditis in Nothnagel's "Practice" ("Diseases of the Heart"), Phila., 1908, 178.

by pressure. Bouillaud (1833) showed the independence of myocarditis from endocarditis and pericarditis. Hamernik (1844) and Dubini (1844) gave simultaneously the first microscopical reports on inflammation of the papillary muscles. Latham (1846) and Craigie (1848) described purulent myocarditis. Rokitsansky pointed out the relation of myocarditis to aneurism of the heart, and Virchow described parenchymatous inflammation. Thomas Beville Peacock, in his "Croonian Lectures" of 1851, described overstrain of the heart. J. M. Da Costa described "irritable heart" in soldiers of the Civil War (1862-71). Sir Clifford Allbutt elucidated the effects of overwork and overstrain of the heart in those engaged in occupations requiring great exertion (1869-71). Fragmentation of the heart fibers was first described by Renaut in 1877. Sir John and Sir William Henry Broadbent have devoted especial study to pericardial disease, particularly adherent pericardium (1895).

Rupture of the heart was first noted by Harvey in his second letter to Riolanus (1649). Morgagni (1761) said it can only occur when the muscular tissue is diseased. It is interesting to note that Morgagni himself died of this condition. Corvisart first described rupture of the chordæ tendineæ and "verruose vegetations" of the valves, which he regarded as of venereal origin. This view was opposed by his pupil Laënnec.

The first great contribution to the heart's pathology was made by Morgagni (1761), who, in his autopsies, found most of the valvular lesions, and connected them with the clinical manifestations. The mitral lesion is particularly associated with his name. Morgagni was also the first to describe heart-block (1761),²⁴ which attained its present status through the classical papers of Robert Adams (1826)²⁵ and Wil-

liam Stokes (1846),²⁶ and the memoir of W. H. Gaskell (1881),²⁷ who produced the condition experimentally. It was Huchard who called the affection "Stokes-Adams' disease." Laënnec fully described the sounds and murmurs of the heart in different diseases, and Skoda clearly differentiated the sounds from the murmurs. The second edition of Laënnec (1826) accounts for dilatation, hypertrophy, hardening, softening, atrophy, gangrene, displacement, abnormalities, intercommunication, rupture, fatty degeneration, ossification, tubercle, cancer, serous cysts, valvular lesions, polyps and neuralgia of the heart. The clinical minutiae, which now make up the pictures of these diseases in our textbooks, were added gradually through the labors of Stokes, Graves, Adams, Bouillaud, Hope, Corrigan, Sibson, Andral, Piorry, and many others, followed by the new era of Gaskell and Mackenzie. What we know of the earlier history of valvular disease is contained in Laënnec's treatise on mediate auscultation (second edition, 1826). Aortic regurgitation was noted by Vieussens (1695), Cowper (1705);²⁸ in more detail, by Hodgkin (1829),²⁹ and in classical form by Corrigan (1832),³⁰ with a superb plate showing the pathological appearances. John Mayow, in 1669, described mitral stenosis; Vieussens gave a good account in 1685; Morgagni, in 1761, gave several autopsies with clinical findings, and with the description of Senac, in 1749, this lesion became familiar to clinicians. King, in 1837,³¹ first individualized tricuspid insufficiency, which was first noted by Morgagni in his autopsies (1761).

²⁴ Adams: *Dublin Hosp. Rep.*, 1827, IV, 396.

²⁵ Stokes: *Dublin Quart. Jour. Med. Sc.*, 1846.

²⁶ Gaskell: *Phil. Tr.*, 1881, Lond., 1882, CLXXIII, 933-1033.

²⁷ Cowper: *Phil. Tr.*, Lond., May, 1705, No. 299.

²⁸ Hodgkin: *London Med. Gaz.*, 1828-9, II, 433-443.

²⁹ Corrigan: *Edinb. Med. & Surg. Jour.*, 1832, XXXVII, 225-245, 1 pl.

³⁰ T. W. King: *Guy's Hosp. Rep.*, Lond., 1837, II, 132-148, 3 pl.

²⁴ Morgagni: "De sedibus," Venice, 1761, I, 70 (Osler).

George Whitley, in 1857,³² gave the earliest complete account of disease of the pulmonary valves. Laënnec said that Corvisart was the first to distinguish by percussion the purring or cat-like thrill (*frémissement cataire*) in valvular disease. Austin Flint, in 1862, showed that a presystolic murmur can be produced in cases of aortic insufficiency without mitral lesion.³³ Laënnec, in spite of the stethoscope, did little to clarify the diagnosis of mitral disease, which began to assume accuracy in the treatise of James Hope (1832). The early history of pulse-counting (Cusanus, Kepler, Sanctorius, Sir John Floyer) has been given by Weir Mitchell in his "Early History of Instrumental Precision in Medicine" (1892). The use of the watch in timing the pulse was due to Louis, Graves and Stokes.

In 1632 the Earl of Clarendon in his *Memoirs*, described a case of angina pectoris in his own father. Morgagni again described it in 1761 and in 1772, William Heberden gave his classical account,³⁴ which was followed by the investigations of Jenner and Parry. John Hunter suffered from the disease for twenty years (1773-93) and died from it. At the autopsy Edward Jenner found calcification of the coronary vessels. The use of amyl nitrite in the treatment of angina pectoris was introduced by Sir Lauder Brunton (1867).³⁵

In 1881 Gaskell first investigated the electrical condition of the heart with a galvanometer.³⁶ In 1889,³⁷ Augustus D. Waller first measured and figured the action currents of the heart by means of electrodes in contact with the wet skin and connected

with a galvanometer or a Lippmann electrometer. This led to the invention of the ink-polygraph of Sir James Mackenzie, Jaquet's cardiosphygmograph and the string galvanometer of Einthoven (1903).³⁸ With this instrument and the electrocardiograms obtained from it such conditions as heart-block, auricular fibrillation, paroxysmal tachycardia, pulsus alternans and pulsus bigeminus were closely analyzed and defined by Sir James Mackenzie,³⁹ James Lewis, A.W. Hewlett and others. Mackenzie and Cushny, with its aid, elucidated the uses and limitations of digitalis. The English periodical *Heart*, founded in London in 1909, and edited by Thomas Lewis,⁴⁰ contains most of these important investigations.

Before the latter half of the nineteenth century, patients with heart disease were usually required to rest and keep quiet. In his treatise of 1854, William Stokes pointed out that "the symptoms of debility of the heart are often removable by a regulated course of gymnastics, or by pedestrian exercise, even in mountainous countries, such as Switzerland or the Highlands of Scotland and Ireland." Gradually the Swedish movements of Ling and the mechanical contrivances of Zander were applied, to be followed by the slow "resistance gymnastics," breathing exercises and protein diet of M. J. Oertel (1884), and the combined exercises, rest and carbonated baths (Nauheim treatment) of Schott (1880).⁴¹

The modern doctrine of embolism is almost entirely the work of Rudolph Virchow (1846-56), which was followed by the later

³² Whitley: *Guy's Hosp. Rep.*, Lond., 1857, 3 s., III, 252-260, 2 pl.

³³ Flint: *Am. Jour. Med. Sc.*, Phila., 1862, n. s., XLIV, 29: 1886, XCI, 35.

³⁴ Heberden: *Med. Tr. Coll. Phys.*, Lond., 1768-70, II, 59-67.

³⁵ Brunton: *Lancet*, Lond., 1867, II, 97.

³⁶ Gaskell: *Phil. Tr.*, 1881, Lond., 1882, CLXXIII,

393-1033.

³⁷ Waller: *Ibid.*, 1889, CLXXX, 169.

³⁸ Einthoven: *K. Akad. v. Wetensch. te Amst. Proc. Sect. sc.*, 1903-4, VI, 107-115, 2 pl.

³⁹ Sir James Mackenzie: "The Study of the Pulse," London, 1902; "Diseases of the Heart," London, 1908.

⁴⁰ Thomas Lewis: "The Mechanism of the Heart Beat," London, 1911; "Lectures on the Heart," London, 1915.

⁴¹ Schott: *Berl. klin. Wochenschr.*, 1880, XVII, 357-359.

researches of Cohnheim, Bernhard Cohn, Welch and others. Up to Virchow's time, John Hunter and Cruveilhier had firmly established the doctrine that phlebitis is the cause of thrombosis. In 1856 Virchow turned this about by showing that coagulation and other mechanical obstructions of the blood-current may initiate thrombosis with subsequent phlebitis. Bacteriology established the fact that pathogenic micro-organisms may set up a phlebitis, in which case thrombosis is again secondary.

A case of malformation of the heart was reported to the Royal Society by Wilson in 1798. Meckel studied the resemblances between these congenital malformations and the hearts of reptiles, amphibians and crustaceans (1802). In 1858 Thomas Bevell Peacock published the first systematic treatise on the malformations of the human heart, an outstanding work which was reissued in 1866,⁴² and followed by the great memoir of Rokitansky on defects of the cardiac septa (1875) and the fine study of Maude Abbott on "Congenital Cardiac Disease" (1908).⁴³

Aneurism was not known to Hippocrates, but Galen knew of aneurism from dilatation and traumatic aneurism, recognizing the thrill in the former. Galen recognized arteriovenous aneurism "as a sequel of careless vivisection and cured a case of it" (Osler).⁴⁴ William Hunter described it in classic form in 1757.⁴⁵ In 1555, Vesalius diagnosed aneurism of the thoracic and abdominal aorta (case of Leonard Velser) and confirmed his diagnosis at the post-mortem (1557). Fernelius, in his *Pathologia* (1592), first noted that "aneurism likewise

happens sometimes in the internal arteries, especially under the breast, about the spleen and mesentery, where the venous pulsation is often observed" (Osler).⁴⁶ Ambroise Paré recognized aneurism by anastomosis, erosion, rupture and injury. "He was the first to suggest the relation of aneurism to syphilis, and he described the noise or blowing sound associated with the tumor, and the frequency of thrombosis in the sac and the occasional calcification" (Osler). Modern pathologists, while recognizing mechanical disturbances of the circulation as an accessory factor in the production of stagnation thrombi, regard a phlebitis as beginning in the outer coat of the vein and proceeding inwardly until endophlebitis is established, so that thrombosis is usually secondary to lesions of the veins, the old Hunter-Cruveilhier view. The syphilitic causation of aneurism was later established by Lancisi (1728) and Morgagni (1761), who also gave Valsalva's mode of treatment.⁴⁷ William Hunter, in his account of arteriovenous aneurism (1775), first separated the true, spurious and mixed forms. The pathology of aneurism was later investigated by Scarpa (1804), Cruveilhier (1849-64), Rokitansky (1850), Hemstedter (1873), Köster (1875) and others. Dilation-aneurism of the aorta was clearly described in 1815 by Joseph Hodgson,⁴⁸ who differentiated it from ordinary aneurism, observed its frequency in the arch, its misleading cardiac symptoms, and its association with aortic insufficiency. Trousseau called the latter variety "*maladie d'Hodgson*." In 1507 Antonio Benivieni first noticed cardiac thrombi as "polyps" (fibrinous clots) in the heart (Welch). William Wood of Edinburgh described ball thrombi in the left auricle (1814). Recklinghausen, in 1893, described agglutinative (hyaline) thrombi. Trousseau

⁴² Peacock: "On Malformations of the Human Heart," London, 1858.

⁴³ Abbott: "Mod. Med." (Osler), Phila., 1908, IV, 323-425.

⁴⁴ Osler: "Syst. Med." (Allbutt), Lond., 1909, VI, 620-621.

⁴⁵ Hunter: "Med. Obs. and Inq.," Lond., 1757, I, 323; 1762, II, 390.

⁴⁶ Osler: *Ibid.*, 621.

⁴⁷ Osler: *Ibid.*, 621-622.

⁴⁸ Hodgson: "Diseases of Arteries and Veins," London, 1815.

and Werner, in 1860, first pointed out the association of thrombosis with chlorosis in young women. A detailed history of embolism and thrombosis is given in the exhaustive memoirs of Professor William H. Welch (1909).⁴⁹

Of diseases of the blood, chlorosis was described by Johann Lange, in one of his *Consilia*, as "*morbus virgineus*" (1520),⁵⁰ Virchow described the form with aortic hypoplasia and contracted heart in girls (1870).⁵¹ Hemophilia was first described by John C. Otto, of New Jersey (1803), splenic anemia by Guido Banti (1882), aplastic anemia by Ehrlich, leukemia by Hughes Bennett (1845) and Virchow (1845), purpura hæmorrhagica by Werlhof (1735), pernicious anemia by Addison (1840-55) and Biermer (1872), peliosis rheumatica by Schönlein (1837), infantile infectious purpura by Henoch (1874), multiple telangiectases by Sir William Osler (1901), erythremia or polycythemia by Henri Vaquez (1892) and Sir William Osler (1903).

Of the vasomotor affections, symmetrical gangrene was described by Maurice Raynaud (1862), erythromelalgia by Sir James Paget and Weir Mitchell (1872-8), angioneurotic edema by H. Quincke (1882).

Of diseases of the blood-vessels, phlebitis was described by John Hunter, periarteritis nodosa by Kussmaul and Maier (1866), gouty phlebitis by Sir James Paget (1875), obliterative arteritis by Friedländer (1876). The modern theory of arteriosclerosis owes its origin to the memoir of Sir William Gull and Henry G. Sutton on arteriocapillary fibrosis (1872).⁵² Allbutt⁵³ says that Galen noted degrees of hardness

or softness in the coats of the blood-vessels and that Asclepiades ascribes "certain hemorrhages to decay and rupture of the arterial coats." Morgagni and Haller initiated the pathological study of the arterial walls. Bichat found arterial disease in seven out of every ten men over 60. Scarpa mentions "steatomatous arteries," Matthew Baillie, coronary atheroma. Peter Frank, Broussais and Bouillaud mistook cadaveric staining of the great vessels for an arteritis. The name "arteriosclerosis" was introduced by Lobstein (1833). Bright associated atheroma with chronic renal disease. Gull and Sutton showed that the red contracted kidney of "Bright's disease" is only part of a general arteriocapillary fibrosis, and so established the concept of "arteriosclerosis." The introduction of the sphygmomanometers of von Basch (1887), Riva Rocci (1896), Leonard Hill, (1897) and others revolutionized the diagnosis of arteriosclerosis and Bright's disease. Patients were found who had arterial hypertension without Brightic symptoms or albuminous urine, and this was supposed to be due to idiopathic hypertrophy of the heart. Von Basch called this condition "angiosclerosis," Huchard "presclerosis," Allbutt "hyperpiesis," Volhard and Fahr "benign essential hypertension," Janeway calls it "primary hypertensive cardiovascular disease,"⁵⁴ and states that its recognition is entirely due to the sphygmomanometer. Huchard actually regarded arteriosclerosis as a "clinical entity" and described what he regarded as its clinical forms (1909). It is now looked upon as a simple pathological lesion incident to various conditions. "To call arteriosclerosis a 'disease,'" says Allbutt, "is not pathology but necrology."⁵⁵

⁴⁹ Welch: "Syst. Med." (Allbutt), Lond., 1909, VI, 691-821.

⁵⁰ Lange: *Medicinalium epistolarum miscellanea*, Basel, 1554, 74-77. Translated in E. T. Withington's *Medical History*, Lond., 1894, 290.

⁵¹ Virchow: "Ueber die Chlorose," Berlin, 1872.

⁵² Gull and Sutton: *Med. Chir. Tr.*, Lond., 1871-2, LV, 273-326, 2 pl.

⁵³ This history of arteriosclerosis is derived from Sir Clifford Allbutt's splendid work on "Diseases of the Arteries," London, 1915, I, 3-18, and *passim*.

⁵⁴ Janeway: *Tr. Assoc. Am. Phys.*, Phila., 1915, XXX, 34.

⁵⁵ Allbutt: *op cit.*, 14.

The earliest blood pressure observations on a large scale were made by Richard C. Cabot in 58 cases (1903). Joseph Erlanger, Potain, Janeway and others have done much in this field. Janeway says there were only twelve references to blood pressure in 1886; in 1915 he had over a thousand.⁶⁶ The advantage of the sphygmomanometer over the fingers and the sphygmograph has been well brought out in Allbutt's work on "Diseases of the Arteries" (1915). He points out that every new instrument of precision has been ridiculed by conservative, old-fashioned physicians as "pauperizing the senses." But the truth is that these instruments, "far from pauperizing our clinical perceptions, have, on the contrary, enriched, enlarged and corrected them."⁶⁷ Gibson of Edinburgh said "the sphygmomanometer had taught him how fallacious the finger may be." So, too, the polygraph and the string-galvanometer have given us records of the heart's condition which are to the clinician what the printed notes on the musical staff are to the musician. As any one with a good musical ear can whistle or hum a tune he has

⁶⁶ Janeway: *op cit.*, 29.

⁶⁷ Allbutt: *op cit.*, 61.

heard, so the internist can trust much to his senses; but as the musician gets to know a complex composition by associating it subconsciously with the printed notes, so we can best educate our clinical senses by the electrocardiograms and blood-pressure records.

In preparing this paper, it has struck me forcibly that a large part of our knowledge of the circulation is of English origin. From Harvey's time, the heart alone has been a sort of specialty with English physicians. In reviewing the history of the circulation we can not, however, like the lawyers, regard this part of our science as broadening "slowly down, from precedent to precedent;" its development has been fitful and irregular.

Let us neither lean too heavily upon the past for precedent, nor be too confident about the present or the future. Let eternal vigilance in studying and caring for our clinical cases be our watchword; for some of our present errors may be corrected by the accurate, if empirical judgments of physicians of the past, even as the experiences of the past can best be understood and its errors condoned in the light of the present.

THE SONS OF SYDENHAM

Conspicuous among the physicians of the seventeenth century, great among those of all time, is Sydenham. In early life an officer, one of five brothers who fought in the army of Parliament, he remained loyal to the memory of the Protector, and his doctor's garb covered through life a soldier's love of action and decision. He brought us back to the near study of nature, taught us to look at it clearly, to derive our knowledge wholly from it, and he stands out in history the very embodiment of the insight and practical character of his race. He had but little respect for mere authority, and it is to be feared that, had he lived a hundred years before the time he did,

he would have been cited with Geynes before the Royal College of Physicians for impugning the infallibility of Galen, and would not have recanted. To him everything was observation, experiment. He pointed the way for advance in our science, and happy would he have been if he could have seen the sons of his intellect and endeavor who, following in his path, have made Medicine what it is; for these sons are Jenner and Bright and Addison, and Corvisart and Andral, and Skoda and Frerichs, and the eloquent Trousseau, whose delight it was to quote him, and our own truth-loving Flint.

J. M. Da Costa (1891)

THE JETONS OF THE OLD PARIS ACADEMY OF MEDICINE
IN THE NUMISMATIC COLLECTION IN THE
ARMY MEDICAL MUSEUM AT WASHINGTON, D. C.

By ALBERT ALLEMANN, M.D.

DURING the early years of the Library of the Surgeon General's Office, a number of medical medals were presented to it by private parties. This led Col. Billings, the creator of the Library, to the idea of establishing a collection of medical medals. He went to work with his usual energy so that, in 1888, he had gathered more than 1500 medals and jetons. In that year he gained the services of Dr. William Lee of Washington, a man well versed in medical history and numismatic lore, to arrange the collection. Dr. Lee made a card catalogue, describing and interpreting each medal on a separate, numbered card. As Col. Billings had charge of the Medical Museum as well as the Library, he placed the medals in the Museum, where they are now exhibited. After Billings left the Library in 1895 the collection was continued from year to year by his assistant, Mr. Myers, so that at present it contains more than 3000 medals. After Mr. Myers' death, the addition of new medals to the collection by purchase was discontinued for a long time, but Col. William O. Owen, the present officer in charge of the Army Medical Museum, has taken a renewed interest in the subject and has added a number of valuable pieces, including those struck off by the Paris mint.

One of the most interesting series of medals in the Washington collection comprises the jetons of the old Academy of Medicine of Paris. They range from 1638 to 1793, when the corporation was dissolved by the Government of France. It was a very old custom of the Paris Medical Faculty that whenever a new Dean was elected, which took place every two years,

silver or bronze jetons were presented to all the members of the Faculty. The Dean was not a professor. He had exclusive charge of the administrative business of the Faculty. But he also kept the minutes of the Transactions of this learned corporation, and these minutes, from 1395 to 1792, still exist in manuscript and form a complete history of the Medical Faculty of Paris.

When the practice of striking jetons at the election of a new Dean was initiated is not known. The Transactions of the Faculty mention a jeton as early as 1398, but the older jetons are now all lost and it is probable that the custom was not regularly followed until 1638, when the Faculty decided to strike jetons regularly on a uniform model at every election of a new Dean.

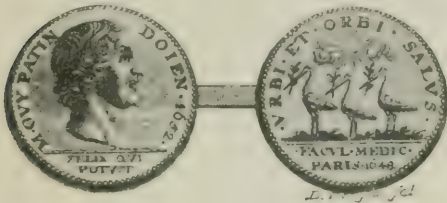
Jetons are not medals in the full sense of the word. They differ from them in that their imprint is flat like that of a coin. Medals are cast while jetons are struck. Jetons are usually of small size, rarely larger than our silver half dollar. The French jetons have all a diameter of $1\frac{3}{8}$ inches.

These jetons of the old French Academy of Medicine are now very rare. Many are entirely lost. The most complete collection is in the possession of the Bibliothèque nationale at Paris. The Academy of Medicine of Paris possesses 108 pieces. Next in completeness is probably the collection in the Army Medical Museum at Washington which has no less than 91 of these rare jetons.

From 1638 to 1793 there were in all 65 Deans. Philippe Harduyn, who was Dean from 1636 to 1638, was the first to be honored with a jeton of the new model. The jeton shows on the obverse the coat of

arms of Harduyn with the legend: Decano M. Philip. Harduyno de Saint Jacque. On the reverse is the coat of arms of the Medical Faculty of Paris, viz.: three storks in a row turned to the left, each one with a laurel branch in his beak. The inscription is: Urbi et Orbi Salus. In exergue: Facult. Medic. Paris. 1638. All the early jetons show merely the coat of arms of the retiring Dean on one side and on the other the coat of arms of the Medical Faculty.

Guy Patin (1602-1672) was the first to place his own effigy on the obverse instead of his coat of arms. He was Dean from 1650 to 1652. The jeton shows Patin's head to the right with the legend: M. Guy Patin Doien. 1652. In exergue: Felix Qui Potuit.



The M. stands for Maître (Magister). In the Middle Ages, the Medicinæ Doctores called themselves "Magistri in medicina" and the Deans of the Paris Medical Faculty retained this ancient title long after it had been abandoned by the medical profession. "Felix Qui Potuit" is the beginning of a passage in Virgil's Georgics.¹

The reverse shows the usual three storks of the Paris Medical Faculty. Patin is chiefly known by his *Lettres*, which were published in 1713. He was not an originator of new ideas,—he even opposed Harvey's great discovery,—but he was a man of an independent mind, he despised the hollowness and formalism of his time and mercilessly exposed the weaknesses of his contemporaries.

¹Felix qui potuit rerum cognoscere causas
Atque metus omnes et inexorabile fatum
Subjicit pedibus, strepitumque Acherontis avari.

The five Deans who succeeded Patin reverted to the old custom of placing their coats of arms on the obverse of their jetons. Antoine Morand, who was Dean from 1662 to 1664, again placed his own effigy on the



obverse of his jeton. From now on the jetons regularly show the image of the retiring Dean, and the coat of arms of the Medical Faculty on the reverse is frequently replaced by other designs.

François Le Vignon was Dean from 1664 to 1666. The obverse of his jeton bears the inscription: M^{re} Fr. Le Vignon. Con^d d'Es^t et Doien. As he carries the title *Conseiller d'état*, Moehsen² supposes that he was body physician to the queen. The reverse of the medal shows a bare arm thrust forth from the clouds, the hand throttling three serpents. The legend is: *Contero Monstra*. This refers to the decree of the French Parliament of 1666 which decided the long



controversy among the French physicians about antimony in favor of those who advocated its value in medicine.

From 1666 to 1668 the Deanship was held by Jean Armand de Mauvillain. His jeton shows on the obverse his effigy by Du Four. The reverse presents the giant

² Moehsen, Beschreibung einer Berl. Medaillensammlung. Berl. & Leipz., 1773.

Polyphemus lying prostrate, while Ulysses puts out his eye with a burning torch. The circumscription reads: Vero Lumine Cœcat. Polyphemus represents François Blondel,



who was one-eyed. Blondel was one of the chief opponents of antimony but lost his lawsuit against the Medical Faculty. Mauvillain is chiefly known by the enmity he bore to Molière. He fell out with Molière's wife and the latter took revenge by inciting her husband to ridicule the haughty



physician in *L'Amour Médecin*, in which one of the four physicians is supposed to represent Mauvillain.

From 1696 to 1700, the Deanship was held by Jean Boudin. The obverse of his jeton shows his bust to the right. The reverse represents the centaur Chiron leading young Æsculapius to a distilling apparatus. The inscription is: *Servat et Docet*. In exergue: *Facult. Medic. Paris. Anno 1700*. Boudin was the first Dean to hold the position for two successive terms.

François Vernage was Dean from 1702 to 1704. His jeton does not show his own image but that of Guido Fagon, body physician of Louis XIV. The obverse with Fagon's bust carries the legend: *Scholæ Tutela Præsens*. The reverse shows the arms of the Paris Medical Faculty and the inscription: *M. Fr. Vernage. Paris. Fac. Med. Paris.*

Decano. Below are the words: *Præsed. Ord. M. Guid. Cresc. Fagon. Archiat. Com. Ult. Ma. 1703*.³ It seems Fagon owed the honor of having his bust on Vernage's jeton to the fact that he was at that time President of the Medical Faculty. Fagon was in 1703 66 years old and Vernage, who was then scarcely forty, honored his older colleague by placing the latter's effigy on the jeton of his administrative term.

While a Dean was usually elected only once for a term of two years quite a number held the position for two terms. Besides Jean Boudin, mentioned above, Armand Douté (1716 - 1720), François Geoffroy (1726 - 1730), Jean - Baptiste Boyer (1756 - 1760), Louis Alleaume (1774 - 1778), and several others were elected twice successively. René Le Thuillier (1768 - 1774) and Claude Bourru (1788 - 1793) were elected for three successive terms.

None of these men of the old Paris Medical Faculty gained eminence in medicine. While England, during the same period, produced such men as Harvey, Sydenham, Willis and Mayow, French medicine was barren. "The physician had become a sterile coxcomb," says Garrison,⁴ "red-heeled, long-robed, big-wigged, pompous and disdainful in manners. Among themselves the physicians were narrowly jealous of their



rights and privileges, regarding their fraternity as a closed corporation yet eternally wrangling about theories of disease and

³ *Præsedente Ordinario Magistro Guidone Crescentio Fagon. Archiatrorum Comite. Ultimo Maii. 1703.*

⁴ Garrison, *History of Medicine*, Phila., 1913.

current modes of treatment." The facsimiles of the jetons accompanying this article afford a striking illustration of this fact.

Claude Bourru was the last Dean of the old Medical Faculty of Paris. In 1793 the Revolutionary government of France, which swept away so many mediæval spiderwebs but in its mania for reforms also did away with many useful and salutary institutions, abolished all scientific corporations and societies, among them the Academy of Medicine of Paris. The practice of medicine was freed from all restriction. It was soon found, however, that the country could not get along without a recognized medical profession and in 1795 the three so-called Écoles de santé of Paris, Montpellier and Strasbourg were established. Napoleon I, the heir of the Revolution, did not restore the Academy of Medicine. The old corporation had enjoyed great freedom and many privileges and had always been very jealous of governmental interference in its internal affairs. This, of course, did not suit an autocratic mind like that of Napoleon. It was not until 1823, under Charles X, that the Academy of Medicine of Paris was reestablished. But the old custom of striking jetons at the election of a new Dean was not renewed. This is perhaps to be deplored. It was certainly a beautiful custom, which was imitated by many European scientific societies.⁵

While the old Faculty of Medicine of Paris was barren of men distinguished in medical science, the new Academy at once opened up with a galaxy of illustrious names. In looking over a collection of medical medals Billroth once remarked that "not

a single one of them had been struck off to commemorate anything more than respectable mediocrity."⁶ This was true of former centuries when men of merit in medical science were rare and when positions of power and influence were entirely due to birth and wealth. It is not true to-day, for at no time have merit and true worth been more recognized than in our democratic age. Of this the French medals struck in honor of medical men during the 19th century give ample proof. The Washington collection includes a large number of these medals, which have beside their medico-historical importance great artistic value. Among the men thus honored are Corvisart, Dupuytren, Larrey, Pinel, Bernard, Chauveau, Ollier, Pasteur and many others.⁷

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⁵ Garrison, *Med. Pickwick*, Saranac Lake, 1915, I, 2.

⁷ The photoprints accompanying this article, slightly enlarged, are taken from copper engravings in Moehsen's "Beschreibung einer Berliner Medallensammlung," as it was impossible to make good photographs from the actual medals, though most of them are still well preserved.

⁶ It would certainly not be out of place if the American Medical Association would strike such medals at the biennial election of its presidents. These medals would form a history of the Association in metal.

THE HISTORY OF INFECTION¹

By ARNOLD C. KLEBS, M.D.,

WASHINGTON, D. C.

NOT only among the Greeks and Romans who still are our principal schoolmasters, but long before them there existed in human language a term to designate the process of infection. It did not always have exactly the same significance which it now has. Tradition preserved for it a certain basic meaning; and convention, according to varying necessities and changing interests, modified its application. This is only the natural variation to which all terms are subject and one of the reasons why it is so difficult for us to enter into the thoughts and activities of former generations and fully profit by their experiences.

When the Roman used the verb "infectere" it conveyed to him not only the literal sense of putting one thing into another, but with the qualification that the "infected" object is altered in appearance or effect and chiefly so as to render it unpleasant, harmful or corrupted.² Now, this corresponds in general to our own use of the word and indeed one might think that we chose it for that very reason, making it only more precise and limited. As a matter of fact we had no choice. The term came down to us gradually through all the intervening generations, even preserving its Latin form. It is evidently the importance of the underlying idea which it expresses

intelligibly that has preserved it, and this idea is neither Roman nor Greek, but simply human. It offers an appropriate word-picture for something of daily incidence and vital importance. It relates the cause with the effect and thus becomes the word-symbol of a primitive ætiologic concept. Words of this kind have a much greater vitality than the more artificial nomenclature of philosophy and science.

Since we have become acquainted with microorganisms and their rôle in diseases, ætiologic research, because of its tangible object, has exerted a determining influence on medicine. It has gone almost to the extreme of making ætiology and bacteriology synonymous terms. Infection to-day means, if we take it in the broad definition of Hektoen, "the entrance into the body of living agents, capable of multiplication, most commonly microbes, which then cause disease." The microorganism as the determining factor of infectious diseases, the specificness of the infection and the invariability of microbic species make this the dominant theory of the day in medicine. Its profound influence is felt in private and public life to a degree unparalleled in the annals of human society. So dominant is this doctrine that the question is hardly ever asked: might there not be, apart from the microbe, pathogenic influences of equal if not of greater importance?

Even those who vindicate for modern scientific research its freedom from dogma (Hamilton) adhere to the all-importance of the living agent in the causation of disease. The others, the followers of Koch, whose labors, they say, have brought the question to "a certain and unequivocal conclusion,"

¹ Subject of an address delivered before the Biological Club of the University of Chicago and the Historical Society of Washington University, St. Louis, in December, 1916.

² The adjective and noun (*infectus* and *infectio*) had more the sense of our "ineffective," while "*infectivus*," at least in Vitruvius, is the thing altered, infected, particularly dyed or colored.

proclaim proudly that the doctrine, even in its most restricted sense, ought to have been long ago "established as a fixed dogma" on the basis of historical tradition and by every-day observation.³ Here we have in modern times a contrast between empiricism and dogmatism which in the past has led to so many wasteful and sterile conflicts. It is immaterial whether the basic theory on which both are agreed was obtained by syllogistic reasoning or by experimental demonstration, neither is concerned with the continuous reality as it appears to immediate intuition; for practical purposes this is broken up into elements, and fixed by verbal symbols (or images of objects) later to be artificially reconnected.⁴

Most of the historical surveys of the doctrine of infection are nothing but panegyrics of the current doctrine, showing past errors or an assumed evolution from vague unconscious gropings towards that final perfection represented by modern achievements. While entirely legitimate, this kind of historiography can give only an inadequate understanding of human thought in the past and no clear outlook into the future. The higher task of history is to study critically the ideas of man about living nature, in the same way that the biologist studies the various phenomena of the organism itself, to promote the understanding of basic principles. If we study the records of the past with this aim before us, we perceive that the concept "infection," although assuming, from time to time, for practical purposes a varying, transitory significance, tenaciously retains a fundamental and primordial relation to disease, possibly identical to the one ingestion holds to growth and sustenance, or fertilization to the propagation of the species. Such generalization may be deemed unscientific and

contrary to the admonition that the historical student should record rather than interpret. But there can be no doubt that the endeavor to disentangle from history the leading and connecting threads adds zest and vitality to the search and no harm is done provided true facts are given without distortion.

The *Annals* have brought in the last number an illuminating study by Dr. and Mrs. Singer on Fracastoro, the first clear exponent of the theory of infection as we now understand the term. The essay shows very well how the mind of a *cinquecento* scholar, unaided by the microscope and bacteriologic technique, could formulate what we believe has now been determined as a scientific fact. But there can be no question that the same idea was in the minds of uncounted generations before Fracastoro. To analyze some expressions in available literature that seem suggestive in this direction is the task I have set for myself in the following.

BABYLONIA AND ASSYRIA

Civilizations which have endured for such long periods as did those of the ancient Babylonians and Egyptians must have been founded and advanced by very practical people. Their efforts and thoughts, while in form differing from ours, must have been directed to the realization of very similar aims. Their evident success, if nothing else, must command our attention, although some are inclined to dismiss as superstitions most of the ideas we encounter among them. Perhaps it would be more profitable if we used the word "superstitions" in Lowell's sense as marking the world's "unfinished business." Are we not apt to overlook the fact that the primitive man, when he tries to promote his understanding of the world by attaching a name or some figurative symbol to the invisible power which he feels affects him in some way,

³ Kolle in "Handbuch der Mikroorganismen" by Kolle and Wassermann, 2nd ed. I, 869, 872.

⁴ See Bergson: *Mind and Matter*. Lond., 1911.

does nothing essentially different from what we are doing all the time? "Seeing is knowing" guided him as it guides us, and the superstitious awe of which we hear so much blinded him far less than is usually thought. Beneath the complex texture of his mythology we find, if we only look for it, frequent evidence of most minute observation and the utilization of experiment.⁵

Theurgic and numinal concepts form the basis of the nosological nomenclature of the ancient Babylonians and Assyrians. The study of cuneiform inscriptions has opened our eyes to a new world. The texts which deal with incantations, divinations, conjurations (exorcisms) and the like contain a great deal of information on medical subjects. The priest, who filled the place of the physician, as so often in history, used these texts as a sort of practical guide book in his daily routine. They were to lead him to diagnosis, prognosis, prophylaxis and treatment of human ills. The compilation of the most important ones can be traced to the non-semitic priests and magicians who practiced their craft before the advent of the semitic Babylonians (dated variously between 5000 and 4000 B.C., or roughly, before 3000 B.C.). The excavations of the great library of Asurbanipal (668-626 B.C.) at Nineveh brought copies of them to light.

For infectious diseases the most important series is that of incantations against the special disease demons and fever sickness (*ekimmu* and *ašakki maršūti*) or the "incantations against the appearance of the dead." Consciousness of regret and fear, evoked by the memories of those that have passed away, sublimized by the mystery of death, these are the principal sources of the belief in the troublesome ghost. The idea of the entrance of the demon into his victim is not always clearly expressed. The incantation, which is really the prayer of a

troubled soul, has the sense: "Let them accept this offering and leave me in peace."

In the divination series the same ideas prevail. They form a minutely worked out system of prognostics, based partly on observation, partly on hypothesis, intended to serve individuals as well as the king or state. The elaborate descriptions of the birth omens and liver omens have evoked great medical interest because they revealed an unexpected knowledge of anatomical detail. From one of the liver-texts we learn of the *mangu*-disease, an infection of the throat which seems to have appeared as an epidemic, something like diphtheria, and another of the face which has been identified as erysipelas.⁶ There is naturally a great deal of arbitrariness in this nomenclature of diseases in which it is often difficult to distinguish whether the demon or the disease that he is supposed to have produced, is intended. Still, whether demon or disease, we have quite a number of names which are thought to specify infectious diseases as, for instance: *Bennu*, *sassatu*, *sakikku*, *batu*, *mursu*, *si-ib-tu*, *ummu*, *buntu*, *li'bu* and in a class by themselves *sidanu* and *miktu*.⁷

While religious cult, just as scientific research, produces a large and somewhat mysterious nomenclature, the language used to define personal property in sale or purchase strives towards clearness and circumscribed precision. The right of the purchaser of a slave to return the same to the seller at the original price after a certain, stipulated period, in case of an illness or defect which was not obvious at the time of sale, was recognized in the famous law

⁵ Thus we see, for instance, on various Assyrian monuments some divinities depicted in the act of fertilizing manually the flower of the date palm.

⁶ Cuneiform Texts, Part xxviii, 43; and for many further details the works by Jastrow: "The Civilization of Babylonia and Assyria," and "Religion of the Babylonians and Assyrians," in three volumes, which contains translations and discussions of numerous texts (incantations and divinations). Phila., 1915.

code of Hammurabi.⁷ Slave contracts based on this law have come down to us in great number not only from Babylonian, but also from Assyrian, Persian, near-Asiatic and finally Greek times. Since the diseases are usually stipulated by a name in these contracts and their most striking traits defined by the practical exigencies of the contract, it was hoped that their study would perhaps bring out more precise details about the ancient knowledge of a circumscribed group of diseases. As a matter of fact it was found that also here accurate identification offered great difficulty and that it was much wiser to be satisfied with the general information obtained.

It is fairly generally agreed among experts that the two names *bennu* and *sibtu* which are found most frequently in these contracts were meant to designate those diseases or defects whose occurrence could invalidate the sale. Non-medical Assyriologists were quick to identify them in various ways. Fever and ague (Harper, Jensen), syphilis (Ungnad) and lepra were in turn proposed⁸. Sudhoff, by a very interesting and ingenious argument based upon a mass of corroborative evidence, has come to the rather startling conclusion that both terms together were meant to indicate a seizure of epilepsy. This would put the subject apparently out of consideration in this place. But epilepsy and other psychotic and neurotic affections have been regarded through long epochs as caused by infection, and the term psychic infection is occasionally heard in our own day, so that we may be permitted to devote a little time to Sudhoff's translation of *bennu* and *sibtu*, inasmuch as the material he adduces allows possibly a different interpretation.

Assyriologists derive the word *bennu* from a Sumerian ideogram which stands for muscle or tendon, and hence they give as the literal translation "the disease of the muscles." In later contracts, made by Greeks in Asia Minor, Sudhoff found the word *ἱερὰ νόσος* ("sacred disease") in the same place inserted with one or two other names of diseases. This he considers definitely identified with epilepsy and hence he concludes that in the Babylonian contracts the word *bennu* also is meant to designate a disease characterized by spasmodic attacks which incapacitate the victim and by periods of latency might deceive the purchaser. This is quite plausible, but it might be objected that the muscle spasm would not necessarily be the most striking symptom of the attack so as to impose the special name, also that we have no evidence that epilepsy occurred frequently enough to make a special legal provision against it desirable. However this may be, only Assyriologists assisted by medical men can decide the matter. There is, however, a disease the enormous frequency of which in antiquity is abundantly demonstrated by palæo-pathological findings and which, so far as I know, has never been mentioned in connection with *bennu*—I mean *osteo-arthritis deformans*. From the findings in Egyptian mummies we know that it led to marked deformity, such as we see no more, and also that it attacked already relatively young individuals. That it might have appeared as a "rheumatic" muscle disease any modern sufferer of the trouble will readily testify, and thus the terms *bennu* and *rheuma* are about on a par as regards ætiologic lucidity.

Whether the word *sibtu* stands for a different disease from *bennu*, or whether it simply means, as Sudhoff thinks, "seizure" or "attack," derived from the verb *sabatu* "to grab, to seize," is still an open question. Undoubtedly it has been used in various senses, but it seems quite established

⁷ 2267-2213 B.C. See Sudhoff, *Arch. f. Geschichte d. Med.* 1910-11, iv, 353. cf. Johns, C. H. W.: *Assyrian deeds and documents on transfer of property*, 3 vols. Cambridge, 1901, iii, 394.

⁸ See Kohler and Ungnad: *Assyrische Rechtsurkunden*, Leipzig, 1913.

that it designates rather a general concept than a special object and that this corresponds to the Latin *inficere* is more than likely. Very similarly the Greek *ἐπαφή* is used later in connection with lepra, the verbal derivative of which Thucydides employs to designate the infection, in his famous account of the Attic plague, so that Sudhoff considers the Greek word a literal translation of the Assyrian term. The Hebrew word *nega* very similarly determines *saraath* and the two together are translated in our Bible as "the plague of the leprosy."

A series of Babylonian tablets is devoted to lists of animals and plants showing, not only a considerable knowledge of fauna and flora, but also that degree of careful observation necessary for a systematic classification. The latter does not always correspond with ours but that need not disturb us unless we are ready to assume that our classification will survive the next 5,000 years. The Babylonian recognized perfectly well the rôle which certain of the smaller animals played in those diseases which for some reason or other we consider, as parasitic, different from the other infectious diseases.

Dr. F. von Oefele has made a special study of Babylonian entomology and with great courtesy he has put his notes on the subject at my disposal.⁹ The texts begin with the large class of *zumbu*, the fly, in which are enumerated several diptera and hymenoptera. Their names are determined by those of their various hosts and also by water, stone and other objects, or foods for which they showed a predilection. The fly as the symbol of the god of destruction and pestilence, Nergal, appears quite often in pictorial representation as a special emblem, so for instance on a seal cylinder in the collection of the late J. P. Mor-

gan.¹⁰ The next class is formed by the various bugs which as hemiptera, with some 50,000 species, threatens to drown the modern entomologist. Under the name *kalamatu*, 18 different lice are recorded. Some of them figure as worms, which need not astonish us, because even quite close to our time they have been frequently described as such.¹¹ These lice are again named by their habitat beginning with *kalamatu kaqqadi*, the "head louse." There are three hypothetical kalamates which are said to produce internal disease; they are: *mikkana*, *tultu* and *mubattira*. *Tultu* is the best known. It is the worm cause of dental caries and toothache and as such became the object of a great Babylonian incantation. This ætiologic concept we can follow in an enormous literature way into the 18th Century. Dr. von Oefele also calls my attention to the fact that in the texts of the North American Dakota Indians the same concept is found.¹²

BIBLICAL PEOPLES

Many cultural streams have crossed each other in the lands of the easternmost corner of the Mediterranean basin with which the

¹⁰ Nergal is represented in the company of 14 demons over which he has command. They represent various evil influences, some of which surely are diseases, especially fevers. Ungnad in Gressmann: *Altorientalische Texte und Bilder*, I. p. 69 gives their names as follows: 4. *mutabriku*, 5. *sarabdu*, 6. *rabisu*, 7. *dirit*, 8. *ibitu* (?), 9. *bennu*, 10. *sidanu*, 11. *mikit*, 12. *bel-ubri* (?), 13. *ummu*, 14. *libu*. *Bennu* here heads five others which all stand for various degrees of heat, indicating possibly feverish diseases. (See Sudhoff, *op. cit.*, note 7.)

¹¹ "A lous is a worme with many fete & it cometh out of the filthi and onclene skyenne . . ." *Book of the Quinte Essence* (ed. Furnival) p. 19.

¹² He adds: "It is Mongolian in common; from the time prior to the separation of Mongolian and Indian. It entered Babylonian medicine through the Hittites, whom I consider with the Etruscans and other peoples as Mongolian, split off from them somewhat like the Huns."

⁹See Cuneiform Texts, Part xiv, London, 1902.

Bible has acquainted us. Of course it has been intensively studied, but still many puzzles remain to be solved. It was a revelation when not long ago, in Crete, traces of a very high (Minoan) culture were found, one which antedated considerably that of Mycenæ, Troy and of classic Greece. We have also not yet found out about the Hittites, and much remains equally uncertain about the Philistines who seem to have come from Crete. It is in the accounts of the wars between the Jews and the Philistines that we find an early reference to our subject. (11 Sam. ii 3.) When the Israelites were hard pressed by the Philistines they sent, as a last resort, for the Ark of the Covenant to be brought from Shiloh to the front. The Philistines speedily captured it and took it in triumph to Ashdod where it was exhibited in the temple of Dagon. The result was that the statue of Dagon fell down and broke its hands. Then the plague broke out in the town and spread along the coast. This "plague of emerods" is usually identified with the bubonic plague. The subsequent spread of the plague is expressly connected with the arrival of the ark in those three places to which it was in turn removed. During its sojourn of seven months in Philistia it must have done a great deal of harm, and at Ekron, its last station, it was finally decided on the advice of the "priests and diviners" (vi, 2) to send the ark back to the Israelites with an appropriate trespass offering. This was to consist of five golden emerods and five golden mice "according to the number of the lords of the Philistines." These offerings, the text states (vi, 5), were to represent "images of your emerods and images of your mice that mar the land . . . to lighten his hand from off you, and from off your Gods, and from off your land."¹³ These offerings were to be placed

into a separate coffer beside the ark,¹⁴ and to be delivered at the frontier to "those of Beth-shemesh." Here once more the ark proves troublesome, killing some 50,000 people "because they had looked into the ark" (vi, 19). This last outbreak of the plague among the Israelites themselves would seem to emphasize the authenticity of the story. It was a plain and recognized case of infection *per fomitem*, independent of theurgic influence.

Another epidemic, several hundred years later, is also briefly mentioned in the Bible (11 Kings xix, 36). This time the "Angel of the Lord" smote 13,000 Assyrians of the invading army of Sennacherib (705-681).¹⁵ Herodotus (ii, 141) gives more details about this plague and connects it somehow with mice. According to an Egyptian tradition, the Assyrians were decimated through the intervention of the God *Ptah* in the rôle of a pestilence deity. This *Ptah* had a temple at Thebes where he was represented holding a mouse in his hand. We see in all these tales, the mouse creep in somehow. Offord¹⁴ states also that votive mice modeled in silver were found in a river on the Syrian coast, near Sidon, and that mice are carved on Phœnician and Punic monuments. A deity of the latter, *Esbmun*, was, it appears, equated by the ancients with *Æsculapius* and that his cult was very similar to that of the "Smintheus" who inflicts the pestilence upon the Greeks before Troy (*Iliad*, i, 53). Smintheus is the "mouse-god" alternative of Apollo. Other gods with mice attached to their images or receiving offerings of mice were *ATM*, the associate of the hawk-headed sun god *RA* of Egypt, the *Reseph* (Dagon?) of the Philistines, Phœnicians and Cypriotes, according to Offord, worshiped also by Hittite and Syrian tribes.

¹⁴ Cf. Offord in *Science Progress*, London, 1916, x, 570.

¹⁵ Isaiah xxxvii, 36: "when they arose early in the morning, behold, they were all dead corpses."

¹³ This is the only passage from which a concurrent plague of mice might be inferred. (cf. Macalister: *The Philistines*, London, 1914, p. 47.)

One should think that the correlation of plague and mice, evidently noticed in such remote ages, would have impressed the bacteriologist earlier, inasmuch as we can follow it to the threshold of our times as a historical common-place. When Nicolas Poussin in his famous painting, now in the Louvre, of the "Pest of the Philistines," has rats among the crowd of victims in front of Dagon's temple, he found more justification for doing this in practically all the accounts of plague that he might have consulted, than in the rather meager evidence of the Bible. But it would not be sound reasoning to conclude that all this historical evidence must be taken as vague anticipations of present conceptions. Even the use of mice or rats as emblems of plague divinities, or their models as votive offerings is not necessarily conclusive. One must not forget that all these divinities were the controlling forces of all kinds of destructive calamities, for the prevention or removal of which they were implored. The mouse, all by itself, represented one of the most dreaded plagues to an agricultural people and thus may have been symbolized without any reference to the plague in man. Aschoff (*Janus*, 1900, v) tried to get to the bottom of the question why the mouse should have symbolized the plague. From a comparison of the passages in the Vulgate and the Septuagint he suggested that the votive offering might simply have attempted to reproduce the size and shape of the bubo. But from the passage in 1 Sam. vi, 5 it is quite clear that models of both bubo (emerod) and mouse were offered, each apparently for a specific purpose. The custom of offering in sacrifice to a deity models of organs or of symbols of disease is also very ancient and, as is well known, persistent in our day. It is of great interest and has an indirect bearing on our subject because these models were probably thought to draw away, specifically, the anger of the deity from that part of the patient's anatomy.

The Hebrew "scapegoat" and the Greek "pharmakos" are simply variations in form of the underlying idea.

More important than the decision of the question whether the Hebrew recognized the relation between mice or rats and the plague is the very clear account given of the transmission by fomites and the comparative silence about direct transmission from individual to individual. From the sanitary point of view the decision of the relative importance of these two factors has a definite significance and as it is still under discussion it is interesting to note that the ancient Hebrew apparently decided it in favor of those moderns who oppose the extreme contagionist stand-point in plague prophylaxis.¹⁶

The concepts of the insect pests among the Biblical people are largely derived from the Babylonians. Thus the fly, the mosquito and other diptera play also with them a rôle in cult and elsewhere. Ekron, which we have already mentioned as one of the stations of the Ark in Philistia, held an ancient and famous shrine dedicated to *Baal-zebub*, which name, literally translated, means the "Lord of flies." Macalister identifies Ekron, not with Akir as is usually done, but with the modern Dhikerin farther south, near which still exists Deir edh-Dhubban, "the convent of the fly." The shrine of Baalzebub was so famous for its oracles that the Jewish king Ahaziah, when ill, sent to consult it, disregarding thereby the general prejudice of the orthodox against foreign divinities (11 Kings i). This Baalzebub, who only later in official demonology became one of the gubernators of the Infernal Kingdom of Lucifer, represents, as fly-avorter, a very ancient and widely prevalent anthropomorphic conception. He is surely a Babylonian importation, probably even older. He and his female counterpart *Asbtoreth* (Astarte, Ish-

¹⁶ See G. Sticker. *Wien. klin. Rundsch.*, 1898 and his exhaustive monograph "Die Pest," Giessen, 1908.

tar), so popular among Assyrians, Phœnicians and Canaanites, proved very tempting to the Jews whose leaders painted them so black that their devilish reputation has long survived. The deep appeal which these, we may call them ætiological, divinities exerted upon the human soul, is a very interesting fact to note, as well as the opposition which they encountered from the learned. It is also known that Hippocrates had to warn his pupils against the demoniacal theory of disease. Baalzebub of Ekron and the BaalBerek (Berith) of Shechem (in the Talmud) was known to the Greeks as the Βάαλ μύϊαν and probably directly transmitted into their own cult as the Olympian Zeus Apomuioi, of whom Pliny speaks in his Natural History (xxxix, 34), where he also mentions the use of fly ashes in the treatment of alopecia "to drive away the fly."¹⁷ All these are only echoes of the Elamite and Babylonian rites, brought out by the French excavations at Susa, fixed by the fly-emblem already alluded to. The curious persistency of the popular association of health and fly is illustrated by a pretty story Macalister (l. c.) tells about the healing spring of St. Michael in Kirkmichael (Banffshire) which, in popular tradition, had always been presided over by a fly and the neglect of which as late as 1820 was deplored by an old man who "in the days of his youth enjoyed the pleasure of seeing the guardian-fly." Deeply rooted in the folk soul is this old and ever-young concept of this relation of fly and health; and as we watch the "burnt-offerings" of hecatombs of trapped flies rising to the skies from the camp fires of the U. S. Army we do not seem to be so very far from Babylonian.¹⁸

More closely in concordance with our views on infection are the prophylactic laws against the *saraatib* (the collective name for lepra and similar diseases) which are re-

¹⁷ See M. Hoefler: Die volksmedizinische Organotherapie. Stuttgart, 1908.

corded in the famous chapter xiii of Leviticus, a book which is known to date from the Babylonian phase of the Jewish people. It became the prototype for similar sanitary legislation close to our own times and led to the provision of institutions which we have every reason to admire. It is indeed the current opinion that the wide distribution of the leproseries throughout Europe was mainly responsible for the gradual disappearance of lepra toward the end of the Middle Ages. It is difficult to understand how again and again the opinion can find utterance that these measures were not based on the fundamental recognition of the infectiousness and transmissibility of the disease, because of the demoniacal prepossessions in the minds of the Jewish law-givers. It is not my intention to enter into this subject fully although in the concatenation of facts it is one of the strongest links. My desire is to bring out facts which are not so clearly self-evident. Morris Jastrow, Jr., has recently discussed the subject (*Jewish Quarterly Rev.* IV, 357). His view is that the laws are mainly based on the demonistic theory of disease which must not be confounded with our own bacterial theories and that the remedies were not used against the disease but against the demons to whom they were distasteful — pharmacology gradually evolving out of demonology. This is, of course, one way of looking at the matter, but it fails to go to the core of it. J. H. Alexander, on the other hand (*Med. Press and Circular*, London), following Clerk Maxwell's famous example, substitutes in certain ancient accounts bacteriologic terms for the demonistic ones. Finding them to fit well, he asks whether this is due to mere chance or whether the Ancients did not anticipate to some extent

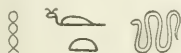
¹⁸ That in our days grave pathogenic possibilities of the fly are recognized is clear from a large special literature which has been admirably reviewed by Henry G. Beyer: The dissemination of disease by the fly. *N. Y. Med. J.*, 1910.

in their crude ideas and beliefs the theories of modern science.

EGYPT

The views the ancient Egyptians entertained about diseases and their causes are much better known than those of the peoples we have just discussed. The differences are in form rather than in substance. I shall content myself to select only a very few examples out of the rich harvest of archeologic research.¹⁹

The disease-making possibility of the worm seems to have been uppermost in the Egyptian mind in all times. Worm diseases being very prevalent, this cannot astonish. But that the relation of worm and disease should have been established in ancient time in those cases where only the minutest examination can reveal the parasite, would seem remarkable indeed. Herodotus gives an account of a regulated inspection of the meat which was destined for sacrifices. It shows among other things that the inspector, the priest, was on the look-out for such small invaders as the cysticercus. When only parts of the animal were sacrificed, the rest was available for consumption and so the inspection may have had a direct hygienic intent. But meat was not the main diet of the Egyptian. Cereals, vegetables and fruits were the staple foodstuffs, but to them must be added as of considerable importance the air-dried fish, at least for the early Egyptian. This latter fact allows us to identify a tape-worm for which there is a hieroglyphic sign:



i.e., the *pend*-worm, with tolerable probability as the *botriocephalus latus*, whose cysticercus lives in freshwater fishes. The

¹⁹ For further detail see the brilliant articles by F. von Oefele: Studien über die altaegyptische Parasitologie. *Arch. de parasitolog.*, Paris, 1901 and 1902, iv and v.

tænia solium and other cestodes may of course have occurred also, but for the former this is not very likely since pork as a whole was despised as food.

The Egyptian anæmia, still very fatal, seems to have been known to the ancient Egyptian. At least a description in the Papyrus Ebers has been interpreted in this sense. Here it is stated that the fatal disease was sent by the God of Death, āāā by name, to both sexes, causing abdominal and other pains, bloody discharges. As its immediate cause the worm *Neltu* is named. Scheuthauer, Joachim, Finlayson identified this āāā-disease with the fatal anæmia caused by the *ankylostoma* or *uncinaria duodenalis*, i.e., our hookworm disease. This restricted identification has lately been disputed on very interesting grounds.²⁰ Pfister opposes very rightly the tendency of identifying too closely with modern concepts those ancient descriptions which covered broad complexes of symptoms and not pathologic entities. He demonstrates that very similar symptoms are caused by the *schistosoma hæmatobium* in that equally fatal disease *Bilbarziosis*, which attacks in some places as many as 70 to 80 per cent of the population (as against 25 per cent of ankylostomiasis). That *Bilbarziosis* most likely entered into the concept of the āāā-disease, Pfister sees in the fact that in the hieroglyphic sign for the āāā-disease, the phallus is the determinative:



If this is so, it would indeed be good evidence, for as he shows in typical pictures, the urethritis with subsequent enormous tumefaction of the penis, as the most striking symptom, would have amply justified the use of this determinative. No other than these two worm diseases seem to have been considered

²⁰ E. Pfister: Ueber die āāā-Krankheit der Papyri Ebers und Brugsch. *Arch. f. Gesch. d. Med.*, 1912, vi, 12.

and around this of course hinges the whole question as to what diseases are comprised in the *āāā*-disease, a question which only the Egyptologists are competent to decide.²¹ If the Egyptians could detect the worm as the cause of the disease, it is astonishing indeed, given its small size (about 10 mm. length, the schistosoma being a little longer than the ankylostoma) and the fact that it is not readily observed in the excretions.

CLASSICAL ANTIQUITY AND AFTER

As we leave the era of these remote peoples and approach the one we know better and recognize as the basis of our culture, we seem to notice the gradual development of circumscribed, almost tangible, notions about the subjects which have occupied us. There we saw man apparently satisfied with the vague connection of primordial ideas, apprehended more by feeling, by intuitive perception, than by reasoning. Here he seems to have discovered systematized thinking as a new instrument by which he could with certainty approach the riddles of the material universe and of life, in order to satisfy that new craving for knowledge which had come over him. We saw how the Babylonian had already begun to classify his observations. Now Greek and Roman begin to classify their thoughts and to write them out; not any more as a solemn religious rite, but for the dissemination of what they regard as a record of their wider and more conscious experience. This, broadly speaking, marks the principal distinction of that epoch which we call classical, as the prototype of our own civilization. All becomes very complex suddenly. Fixed concepts based on intricate reasoning multiply with the individualities of the thinkers. And as we project ourselves into that life, we

see the analogies and resemblances with our own, passing over the essential differences determined by their closer relationship to and dependence on the older cultures; and we see only the dawn of our civilization and the birth of our science, of progress.

What profound differences between these two "classics." The Greek, in his gay, cheerful attitude towards life, exquisitely receptive to the beauty of form, of color and of thought, casts the forces of nature into beautiful anthropomorphic shapes. The same sense for proportion and harmony which we admire in the artistic products of his hand characterize equally those of his mind. Of much sterner stuff the practical Roman. He takes himself and life more seriously, he has a purpose: action and power; art and thought are there only to serve it, they have to be fixed and codified, made into law. Disease for the Greek is a disturbance of the beautiful harmony of health, he thinks it out on those lines and tries to reestablish the harmony. Hence hygiene is the keynote of his medicine. The Roman proudly refuses to consider disease except when its palpable existence forces him to it. Then only and reluctantly he takes the most necessary steps. There is no such thing as scientific Roman medicine and what was brought in from abroad had soon to adapt itself to Roman ways. But, in general, thought on somatic needs, on medicine, formed only a small fraction of the philosophy which was engrossed with seemingly higher ideals, æsthetical, logical, and religious in turn. And in that small place left for medicine the concept of infection was not apt to thrive.

To enter into details here would lead us far astray. And details do not help us much, considered by themselves, outside of that connection which links them as intellectual phenomena to primordial concepts. That is a task for future historians. But one curious fact becomes apparent already, as we glance over the period: in times of greater

²¹ It is of some interest that Ruffer in his microscopic examinations of Egyptian mummies found the encapsulated or calcified schistosoma hæmatobium, and so demonstrated with certainty the occurrence of Bilharziosis in ancient Egypt.

emergencies such as wars and pestilence, the idea of infection asserts itself in its state of original simplicity. What share has the classical medical thought, with its fund of analyzed observation and experience, in this phenomenon? In the Hippocratic writings, in those of the Alexandrian school, we still detect the influence of the primitive concepts, but gradually they separate and follow different channels. Along with the roaring and sometimes turbid main stream of scientific thought runs the babbling, limpid brook of popular tradition, in which we readily detect the intuitive sources. Here and there they approach each other and sometimes a little runs from one into the other, but on the whole they proceed apart. The poet, the playwright, the philosopher, those spokesmen of folk medicine, the medical writer less and less, re-affirm the eternal validity of the primitive idea of infection whenever they dwell on times of grave danger.²²

The history of infection is usually begun with the period when the animate contagium became demonstrated to the satisfaction of exacting scientists. The cornerstones planted are Fracastoro in the sixteenth, Athanasius Kircher in the seventeenth century.²³ In a certain sense this is true, in another it may be shown that the history of infection as a broad concept of pathogenesis ended when the attempt was made to convert medicine into an exact science. The supreme effort in this direction is centered in Galen, the most industrious and ingenious prototype of the modern medical scientist. Whenever one examines his great work, and analyzes the reasons for the aggressive

and contemptuous attitude he assumed against all other thinkers in medicine, methodists, empirics and pneumatists, one is impressed by the logical sequence of his arguments, by his evident eagerness for objective examination in the solution of his problems, but one can not fail to see that he juggles with his premisses and assort his facts just to show the stupidity of the others and especially that of the "ass of Thessalos," his chief abomination, and that he is not above a feeling of jealousy towards those successful practitioners.

The differences between the opposing schools were formal rather than real, in theory at least, but the methodists were more ready to adapt themselves to Roman peculiarities which Galen scorned. This is brought out very well by Meyer-Steinieg in his essay on Thessalos of Tralles²⁴ where he shows how the Roman always favored popular as against scientific medicine, and how cleverly this was exploited by Thessalos and his methodist *confrères*. Also how strong this Roman preference was so that even Galen had to submit to it in turn. Both parties in the conflict derived their knowledge from a study of the body and its functions, but both in different ways, wherefore they denied scientific consideration to each other. In common they neglected a broader ætiology. True, Galen had evolved logically an ætiologic system, but based it almost entirely on an elaboration of Hippocratic humoral concepts and the theory of innate qualities. He was too much absorbed by the variegated phenomena in the body and too much opposed temperamentally to the superstitious nature of external forces, to

stress they start into life and take command. Dumb and invisible, some are yet our masters in all critical times."

²³ For the details of this period see the painstaking review by Charles and Dorothea Singer: *The Development of the Doctrine of the Contagium Vivum, 1500-1750*, *Int. Med. Congr. Sect. Hist. Med.*, 1913, pp. 187-207.

²⁴ *Arch. f. Gesch. d. Med.*, 1911, iv, 89.

²² From a review of Sir Bampfylde Fuller's new book ("Man as he is," London, Murray, 1916), in the *Times Literary Supplement* of Nov. 23, 1916, which I receive as I am reviewing my Mss. I find that he has come to similar conclusions: "With man as we know him, living in an artificial state, recollections of his experience count for more and more, and the primitive impulses for less and less. They are by no means dead. In certain circumstances of strain and

ever clearly see and admit the fact of infection, or at least its importance. "Who does not know, he exclaims, that brine and seawater preserve meat and keep it uncorrupted (aseptic, ἀσηπτα), whilst all other water—the drinkable kind—readily spoils and rots it" (διαφθείρει τε και σήπει).²⁵ But this did not suggest to him any external origin of this corruption. To him it is a spontaneous process, apt to occur also inside the body, just as the innate heat, which according to him has no outside source, as Erasistratos thought. Such facts as he notes them down serve him only to support ingeniously his humoral theory. For sixteen hundred years scientific medicine speculated and experimented on very similar lines.

The lay writers Celsus, Cato, Varro, Columella, Pliny, Vergil, Vitruvius and others note the fact of infection as a commonplace that needs no argument. Could any one express it more clearly than Lucretius in his famous poem, *de rerum natura*, which had such a great influence on the thought of the Middle Ages?

Primum, multarum semina rerum

Esse supra docui, quæ sint vitalia nobis:

Et contra, quæ sint morbo mortique, . . .²⁶

Had Galen seen in this and in Lucretius' *morbidus ær* and *pestilintas* anything else but a poet's license, we would surely have a long treatise from him on the subject, and not only his casual references to the contagiousness of certain diseases. And still, in spite of Galen's science which was triumphantly to conquer the world, we find Ammi-
anus Marcellinus, last but not least of Roman historians, telling that the Antoninian plague was caused by soldiers breaking into the tem-

ple of Apollo where Chaldean priests hid the morbid virus. Nergal, the god from Mesopotamia, still wants his voice heard in the matter!

This voice arises again and again as we traverse the coming centuries. Hardly perceptible in the scientific writings of the Middle Ages, though always traceable, it becomes more and more subdued by the one eager interest of Christian aspiration to use the knowledge of the world for the understanding of the Bible. Science becomes the handmaiden of theology: "Non potest intellegi sacra Scriptura sine aliarum scientiarum peritia," wrote Bonaventura.²⁷ And when modern historians claim that the turn of the tide came in those times with the introduction of the experimental method, hailing Roger Bacon and his "experimental science which neglects argument" as a sort of savior of science, it can not appeal to one who has heard the far cry for observation, experience and experiment from the dawn of human thought. It certainly is difficult to understand how such evaluation could ever be deduced from Bacon's naïve belief in the powers of this "new science" and its master, Pierre de Maricourt.²⁸ Infinitely more important it is to recognize in those times the profound social reorganization which is taking place, leading to powerful and multiple organizations of corporate interests, the mediæval townships and universities. This is more significant even than the setting free of the purer classical spirit after the capture of Constantinople, and its influence on arts and sciences, because for the first time an organized popular will asserts itself which henceforth cannot be neglected. Already it shows its creative possibilities in the measures for the protection of the public health. No careful student of the decrees of this

²⁵ Galen: On the natural faculties, B. II. 120, translation by A. J. Brock. London, Heinemann. N. Y., Putnam, 1916. Loeb's "Classic. Lib."

²⁶ First, as I have said before, seeds of many things are vital to us; and again others that bring disease and death . . .

²⁷ "Epist. de tribus quæstionibus."

²⁸ See Henry Osborn Taylor's brilliant article on Roger Bacon in his "Mediæval Mind," London, Macmillan, 1914, vol. ii, 514.

time providing sanitary legislation, quarantine measures and disinfection against various diseases and especially plague, leprosy and phthisis, can fail to see how much all this is based on the fundamental concept of infection. Imperfect as are all human institutions these measures were often excessive and unnecessarily severe. Because of this inherent defect, which our own measures share, they hardly merited being held up to ridicule by Koehler at the International Conference on Sanitary Legislation in 1897. It is characteristic of the prevailing historical shallowness that he cited the mediæval decrees against cholera, a disease which first appeared in Europe only 100 years ago.²⁹

Many instances might be cited to show how often the lay mind, grasping a fundamental principle, drew instinctively and spontaneously the necessary consequences and it is somewhat depressing to have to acknowledge that so very often this occurred without the aid of the scientist and sometimes against his protests. But only the recognition of the fact can indicate the road to improvement. I shall not try to cite many instances but I cannot refrain from alluding to that last event in the history of infection, sufficiently remote to permit critical analysis, which shows the extraordinary viability of the primordial concept and its application. I mean the great experiment of prophylactic variolation during the period of from 1721 to 1840. It is almost forgotten over vaccination although neither the one nor the other owed its origin to scientific medicine. I shall merely repeat what I said before about the work of Angelo Gatti in which he gave expression to the thoughts underlying the movement, against the opposition of the Medical Faculty of Paris: First he discusses the ætiology of smallpox and turns sharply against such futile terms as "fermentation, leven, humores, ebulli-

tion, effervescence, germ, etc." On the meaninglessness of such terms a mass of physicians base their therapeutic procedures; they use them even in such cases where a Sydenham or Boerhaave would have been content to observe and describe. For Gatti variola is produced by a foreign body that has entered the organism from without. Transmission takes place by contact, or through the organs of respiration or digestion. The "virus" reproduces and multiplies itself. Smallpox is the constant and definite effect of it, strictly specific. Variolation is the transmission of the disease controlled by intelligence instead of accident. For the purpose of inoculation the virus must be modified. Gatti's purposeful attempts at attenuation might still be read with profit by modern experimenters.³⁰

CONCLUSIONS

We are too near our own time to form a broad judgment of our methods and concepts. When we review the many fertile applications made by microorganic biology in every-day life, the advances of a purposeful prophylaxis and of sanitary sciences generally, to doubt the correctness and utility of these efforts would require a hypercritical and entirely objectionable attitude of mind. And also as regards our modern methods of laboratory investigation, we must agree with Welch, when he said here at the University of Chicago in 1907, that "we cannot foresee a time when purely observational and descriptive biological studies, which to-day hold the first place, shall not continue to have their value."³¹ It is probably better in the interest of our aims that we should rather over- than

²⁹ A. C. Klebs, Heft 7. Hist. Biologie d. Krankheits-erreger. Giessen, 1914, also The historic evolution of variolation, *Johns Hopkins Hosp. Bull.*, 1913, xxiv, 69.

³¹ Welch: The Interdependence of medicine and other sciences of nature. *Science*, 1908, Jan. 10.

²⁸ See G. Sticker in Heft 2, Zur historischen Biologie der Krankheitserreger, Giessen, 1910.

under-estimate the absolute value of our methods and achievements. In the wider realm, just as in individual life, an insidious dwelling on the past may lead to paralyzing speculation, self-depreciation and hesitation. Here as there, such tendencies must be discountenanced. But, on the other hand, it can not be denied that the taste for self-exaltation, rampant to no small extent, merits equal attention, as it may easily lead to overindulgence and mental indigestion.

Viewed with this general proviso it may perhaps not be unprofitable to picture the impressions a future historian might gather from a perusal of our bulky literature. Would he see that the elaboration of the doctrine of the specificity of cause and effect in infectious diseases, which "*de tout le temps toutes langues ont dit*" as Bretonneau put it, already in 1855, has led us to a deeper and more correct comprehension of these diseases? May he not conclude that we have not drawn from it the full logical consequences, that we have persistently disregarded our negative findings and, in overestimating the importance of the positive ones have come to a sterile generalization of contagionism? Will he admire with Sticker the courage of Pettenkofer when he insisted, in his famous cholera doctrine, less on what he had determined and knew, than on what he *did not know* and what needed to be brought out? Or, will he brand him, with Liebermeister, as "a subtle and sometimes humorous dialectician," notwithstanding the solid results obtained as a consequence of Pettenkofer's and others' sanitary reforms?

It is worthy of serious reflection whether the day is not likely to come when those efforts now occupying the center of the scientific stage, that is, the search after the specific microorganism, its minute identification by complex experimentation and the prophylactic and therapeutic application derived therefrom, will be relegated to a less conspicuous place. We admit contributory

causes, but by their very subordination we show how difficult it is for us to see in them anything but unimportant influences. And we forget that it is only the obviousness of one factor and the lacking clearness of the other which determine the artificial subordination. Pettenkofer's *x* we have found but the equally important *y* and *z* have yet to be supplied in the ætiologic formula.

Shall we desist from this deeper ætiologic search because of intrinsic difficulties? The reserved position of Virchow and Cohnheim toward it will be recalled. To them ætiology seemed too vast a subject, involving too many different factors and technical methods which could not all be fitted into one scientific garment. Hence they persisted in observational and descriptive methods. Koch and his school of technical artists, without any such restraint but also without the broad outlook of their predecessors, were heralded as the founders of a new medicine. Their historian, Abel, describes the final triumph in these eloquent words: "Laboriously, slowly and late, but at last with certainty, the pure contagionistic theory has attained to the sole rulership in science." All this in barely forty-five years and based almost entirely on technical and instrumental improvements. The "sole ruler" is difficult to please, a failure to solve some particular problem is invariably put to faulty or inadequate technic, never to a wrong direction of effort, and the object of research, may it be the infecting organism or its carrier, must remain unalterably the same. We look down upon the mediæval scholar who attempted the solution of similar problems by syllogistic structures of thought based upon insufficient facts. We have undoubtedly more facts, but can we prove their sufficiency by subtleties of experimental research, so often unrelated to actual exigencies? Multiple facts brought out by inductive research do not combine, as Francis Bacon expected they would, infallibly leading to really useful gen-

eralization. Never yet in the world's history has a great progress, a discovery of fundamental importance, been achieved by this method.

There are some signs of a reaction against the present concepts and methods of pathology. It is no more a cellular pathology in Virchow's sense. The doctrine of the cell as the vital unit, one of the most useful generalizations in biology, does not rule pathology any longer. The limits of cellular autonomy and the interdependence of the units, only dimly admitted by Virchow, are becoming better defined. The concept of the organism as an entity (also in its pathological phenomena) and of its essentially fluid constitution opens a wide outlook through the work of W. Roux, Jacques Loeb and Albrecht. In accord with these modern concepts, it was one of the pioneers of ætiologic research, Edwin Klebs, who defined infectious disease as the resultant from the interaction of different bodies, yielding different products and phenomena. And he al-

ready postulated, as of prime importance, that all processes within the sphere of living bodies just the same as in that of the non-living, must take place according to the same fundamental laws; that, therefore, also in pathology, there is no room left for a special vital force.

In all these newer tendencies the interdependence of medicine and the other natural sciences becomes ever more clearly visible. It will need the work of genius to bring about the needed efficient interaction. We may have to wait long for such an one. Meanwhile the common ground might be prepared, and we believe that nothing can do it so well as organized historical research in science, because, in George Sarton's admirable words: "Science, divided into water-tight compartments, makes us feel uneasy;—a world split into selfish and quarrelsome nations is too narrow for us. We need the full experience of other countries, of other races; we need also the full experience of other ages. We need more air!"

MARSHALL HALL'S PROOF OF REFLEX ACTION

You observe this living frog: its sentient and voluntary functions are obvious. I divide the spinal marrow, below the occiput, with these scissors: all is still. There is not a trace of spontaneous motion. The animal would remain in this very form and position, without change, until all signs of vitality were extinct. But now I pinch a toe with the forceps. You see how both posterior extremities are moved. All is now still again; there is no spontaneous motion, no sign of pain from the wound made in the neck. It is without sensibility—without volition; the power to move remains—the will is extinct. I now pinch the integument. You observe the result—the immediate recurrence of excito-motory phenomena.

I now destroy the whole spinal marrow with this probe. It is in vain that I pinch the toes; the animal, the limbs are motionless!

Could the former excited motions be those of irritability? I will try the truth of this suggestion by seeing whether, now that the axis of the excito-motory system is destroyed, with its phenomena, the application of a slight galvanic shock will prove the subsistence of irritability. You see how instantaneously and forcibly the muscles are simulated to contraction.

Is not the proof, from these experiments, of the distinction between the motions of volition, of the excito-motory system, and of these from those of irritability perfectly and unequivocally complete?

TEXT OF WILLIAM SHIPPEN'S FIRST DRAFT OF A PLAN FOR THE ORGANIZATION OF THE MILITARY HOSPITAL DURING THE REVOLUTION

[Through the courtesy of Colonel William O. Owen, U. S. Army, Curator, Army Medical Museum, Washington, D. C., we are able to print from No. 22, folio 99, papers of the Continental Congress, William Shippen's first draft of a plan for the organization of the Military Hospital Service during the Revolution. This document, by Shippen and John Cochran, was written out in Shippen's own handwriting and transmitted to Congress February 14, 1777. The committee report on the same, written out in the handwriting of Benjamin Rush, was then submitted to Congress on February 27, 1777. The heading of the page given in facsimile, "For the flying Hospitals," would look at first as if it were an anticipation of the innovation of Baron Larrey. But, as the text shows, camps and hospital wagons only are meant; in other words, the plan proposed was a sort of precursor of our present field hospital, but not the rapidly moving field hospital, with litter-bearers, which Larrey and Percy made accomplished fact.—EDITOR.]

THREE Districts *Northern, middle and Southern.*

To each one Director General—

His duty, with the advice of the general or Command^r-in-Chief, in his respective Department.

To establish a sufficient number of Hospitals at proper places for receiving the sick & wounded of the army & to dispose of the same as he shall think proper— To provide & prepare medicines Instruments & dressings; Bedding, & other necessary furniture, proper Diet & every thing necessary for the subsistence & comfort of the sick & wounded Soldiery & the officers of the hospital & to pay the salarys of the latter agreeable to establishment of Congress, together with all other expences of the hospital.— To execute which He shall be allowed the following officers to be appointed & discharged by him in such numbers as the necessity of the army may require & the General approve an authentick report of which to be immediately transmitted to Congress.

Assistant Directors—to superintend the Hospitals to the care of which they shall be appointed & see that ye same are provided as before specified agreeable to ye instructions of the Director Gen^l—

An Apothecary General whose Duty shall be recieve, prepare & deliver medicines and other articles of his department

to the Hospital & ye Army as shall be ordered by ye Dir. Gen. Apothecary and mates to obey ye Apoth. gen^l.

A Commissary—whose duty shall be to procure store and deliver provisions, forage such other articles as the Director shall judge necessary for ye use of ye hospitals in the purchase of wch he shall frequently consult *with* & be regulated by the prices of the Quartermast^r and Commiss^r generals.

Adjutants to ye Commissary & Store-keeper, a Steward for every 100 sick who shall recieve from ye commissary provisions, distribute them agreeable to ye orders of the Gen^l. or Physician & surgeon gen^l. of his dept. & be accountable to ye commissary for ye same.

a matron to every 100 sick who shall see the provisions are properly prepared, the Wards, Beds, & Utensils shall be kept in neat order, & that ye greatest Oconomy be observed in her department. A nurse to every 15 sick at the direction of ye matron.

An Hostler or Stabler to receive ye forage from the commissary and to take care of ye Waggon & other horses belonging to the Hospital agreeable to orders he shall recieve from the Dr. gen^l. or such other officer of ye Hospital he shall appoint.

A Secretary whose Business shall be to keep the accounts of the Hospitals, shall

For the flying Hospital 13

There shall be a Director Surgeon, ⁱⁿ whose duty in subordination to the Dir. gen. shall be to ^{superintend} receive from him a suitable number of large strong Teams - B. & M. Medicine & Hospital Stores for such sick & wounded persons as can't be transported to a general Hospital, or may be rendered fit for duty in a few days - He shall also see that the sick & wounded who are in his Hospital are properly attended & be in a condition to be conveyed to a gen. hospital when he shall be ordered by the Dir. gen. with a proper number of convenient Waggon & Drivers - He shall see that the regimental Surgeons & mates attend their Regiment & those who refuse to obey his or the Dir. gen's directions shall be tried & punished as contumacious & shall direct. He shall have under him stewards to receive & properly dispense such articles of diet as ^{the} Dir. gen. shall give or order to be given him by the Com. of Army or Hospital.

Brigade Surgeons - who shall superintend

recieve and deliver ye monies agreeable to ye orders of the Direct^r Genl.—

Clerks for the same.—

Such officers & soldiers as the general shall think proper to guard ye hospitals & to conduct such as shall be weekly discharged ye Hospital to their respective regiments & who shall obey the directions of the Direct^r Genl. or the Physician and Surgeon Genl. while on this duty.

There shall be also

Two Physician and Surgeon Generals—who must superintend & regulate the practice of Physic & Surgery in such Hospitals as the Dir. Genl. shall appoint them to, & in his absence they shall appoint the Physicians Surgeons and other officers of said Hospital to such dutys as they shall think proper & shall report weekly to ye Dir. genl. or in his absence to ye ass. Dir. the state & number of the sick & wounded of their Hospital & the delinquent officers of ye same. They shall also see that those who are fit shall be delivered every week to the officer of the Guard to be conducted to ye army.

Senior Physicians & Surgeons who shall attend, prescribe for & operate upon and see properly treated such sick & wounded as shall be allotted them by ye Dir. genl. or either of the Physician & Surgeon genl.

Second Surgeons to assist ye senior Surgeon and be under ye same direction.

Mates who shall attend the physicians and Surgeons when they prescribe and operate, shall dress ye wounded, recieve from the apothecary, mate of ye Hospital & put up the medicines & see that they are regularly & properly administered to ye patients.

A suitable number of covered and other Waggons to be supplied by ye G. M. G.

For the Flying Hospital

There shall be A Director and Surgeon Genl. whose Duty in subordination to ye Dir. Genl. shall be to superintend & recieve from him a suitable number of large strong Tents—Beds, Bedd[ing,] Medicine, & Hospital Stores for such sick & wounded persons as cant be transported to ye general Hospital with safety or may be rendered fit for duty in a few days—He shall also see that the sick & wounded while in his hospital are properly attended & dressed and when able, to be conveyed to ye genl. Hospital for which last purpose he shall be supplied by ye Dir. Genl. with a proper number of convenient Waggons and Drivers.—He shall see that the regimental Surgeons and mates attend their regiments. Those who refuse to obey his or ye Dir. Genl.'s directions shall be tried and punished as Congress shall direct.

He shall have under him

Stewards to recieve and properly dispense such articles of diet as ye Director General shall give or order to be given him by the Comy of ye Army or Hospital.

Brigade Surgeons—who shall superintend the medical department in their respective Brigades, report the state thereof to the Director of ye flying Hospital & see that the sick & wounded are sent in proper time & in a proper manner to ye flying Hospitals—they shall also attend & prescribe for ye sick and wounded in ye Hospital under ye Direction of ye Surgeon Genl.

A suitable number of mates to dress, & of Nurses and orderly men ye number to be determined and they appointed and paid by ye Dir.

All the above officers to be appointed & recieve such Salarys as the Congress shall please to direct.

THE BEGINNINGS OF INTRAVENOUS MEDICATION

By HORACE MANCHESTER BROWN, M.D., F.A.C.S.

MILWAUKEE, WIS.

ARISTOTLE (B.C. 384-322) saw the blood of a fish flow from its heart into its gills. ("De Part. Animalium," III.) Undoubtedly many men who have had the taste and disposition for wandering in the sinuous paths of medical investigation, or who have found joy in philosophizing with the ancients, have dreamed dreams of speculation as to what might have been the position of the theory and art of medicine and our civilization and religious thought, had Aristotle but had sufficient imagination to have gone a step farther and have thought of the possibility of the way of the return of the blood to the heart.

There is no limit to the horizon toward which such dreams might lead; and to speculate upon the possibilities of such a conception is almost to wander away among the djinn of an Arabian tale, or to intoxicate oneself with musings among the Sepiroth of the Kabbalah.

Whatsoever might have been the result that must of necessity have been the outcome of such a discovery at a period almost 2000 years before the time of Harvey, it is not beyond the realm of reason to believe that the world would have been spared the degradation of the ignorance of the Dark Ages, and the erroneous philosophy of St. Thomas Aquinas, founded upon the physiology of Aristotle, the controversies of the scholastic and dogmatic theologians, the proposition of "two kinds of truth: the Philosophical, founded upon proof, and the Theological, founded upon faith" (See Matthieu Paris. "Hist. Maj.," p. 541, and Mosheim. "Eccl. Hist.," Part II, Cap. 3.), the futile discussions as to the nature of and location of the soul, the problems of generation, metabolism and nutrition; the

nature and functions of the liver, spleen, lungs, and heart, and a thousand other things which are but common-places to-day, but which were insurmountable obstructions to true knowledge up to the middle of the seventeenth century, would never have been considered, or would many centuries ago have been cleared away.

The reader may well ask, What has all this to do with the subject upon which this paper is supposed to treat? The answer is not difficult.

Nothing that can result from philosophizing is ever of any value, until, like the result of any other form of mental activity, it finds its application *ad hominem*. The study of the history of medicine is, in the most intense degree, the study of the development of civilization, not only as applied to community life but as well when applied to the development of the individual. It is a study of the great struggle of mankind as led by its teachers, against the destructive forces of nature, and in so far as the teachers have failed in their grasp of the meaning of things and phenomena about them, in so much has man failed in the speed of his journey toward better health, better mentality, better living and better appreciation of the things of life.

Throughout the world, up to the time of William Harvey, mankind was struggling blindly in a fog of theory, superstition and fear, toward the light, the first glimmerings of which came with the coming of the great anatomist Vesalius, the controversialist Servetus, the keen observer Fabricius; a glimmering which was to burst into a full effulgence which should illumine the path that science might tread, when Harvey by his discovery of the circulation of the blood, illumined the leaders of the world of philos-

ophy and science, and through them gave to the human race those facts which have made all exact medical knowledge possible since his time.

It has seemed to me in view of the great interest that the medical profession has taken in the matter of intravenous medication since the introduction of salvarsan, that a short account of the early history of that method of treatment may not be without interest, and therefore I have to offer a somewhat incomplete review of the records relating to infusion of medicaments and transfusion of blood, during the period between 1490 and 1680.

It will be necessary to glance first at the conditions of knowledge in our profession in relation to the physiology of the blood and its movement during the centuries previous to the discovery of the circulation by Harvey in the year 1613, and his announcement of his discovery by the publication of his book in Frankfort in 1628.

In the year 201 A.D., there died a man in Rome, a physician, who had had seven emperors as his patients and who left behind in his writings, an accumulation of the knowledge of his predecessors, and a system of medicine, which was perfect in its kind, logical in its reasonings, complete and well proportioned in its form and which ruled the medical world for 1400 years; influencing not only the writers on medicine as no other man had influenced them, not only as to the physical welfare of the entire world, but also furnishing the Christian world with a basis for a complete system of theology, although but little of it was founded upon anything more than speculation, while those parts of it which seem to be demonstrations of facts were but falsehoods and erroneous conclusions due to error in observation. This man was Galen.

If we but stop to consider our own surroundings and relations to our own patients, we are brought to realize that his influence extends even to ourselves, and

that on every hand and every day the medical profession here, now, is forced to contend with the erroneous conceptions that were handed down through the years from Galen, and which still hold not only in the minds of the laity, but also in the acts and thoughts of many men within the profession of medicine itself.

Erasistratos, of the School of Alexandria, had established the belief in the minds of medical men and philosophers that the arteries contained only air. Galen by his famous experiment with the hollow reed or a bronze tube (Liber, "An Sanguis in Arteriis Contineatur," Cap. 8) had proved the folly of this belief.

For Galen, the liver was the source of the blood and the *natural spirit*, and the heart was the seat of the essential heat and of the *vital spirit*, while the blood mixed with air in the left ventricle of the heart and passing to the brain through the carotid arteries became perfected in the lateral ventricles, so as to produce the *animal spirit*, which was the food of the soul.

The soul was looked upon as a sort of a triad. The concupiscent soul, the *epithumos*, resided in the liver. This was the passive or feminine element, the desiring or acquiring element in the triad. In the heart resided the acting soul, the *thumos*, the active, masculine element of the triad which produced the vital heat and sent it throughout the body, and which when refined became part of the governing soul, the *hegemonos*, which was the controlling element of the triad. The natural spirit was in the liver and veins, the vital spirit was in the heart and arteries, the animal spirit was in the brain and nerves.

A certain movement of the blood was recognized, and had been since the time of Hippocrates; but this movement was in nowise recognized as a circulation but rather as a *perioidos haematos*, a tide-like movement which was compared to the tides of Eripas, in the strait of that name in

Greece. The blood was produced from the chyle in the liver and then moved back and forth in the veins until it was consumed, a new supply always being produced by the liver.

Some of the blood oozed through certain foveae, or supposed porosities in the intraventricular septum of the heart, from the right to the left ventricle there to form the vitalized blood, which, mixed with air, was sent out through the arteries up to their finer filaments which were supposed to be nervous in character. Some of this vitalized blood went to the brain for further perfection, but none returned, in a circulating sense, to the heart. That blood that went to the lungs was sent to them to nourish them, or to be cooled by them.

It is necessary that we should recall these things in order to understand that which occurred after the discovery of the circulation of the blood.

Wm. Harvey of Folkstone and London, England, lectured to the students upon his discovery of the circulation at St. Bartholomew's Hospital, in the year 1613; this date should be kept in mind. In the year 1628 his book "*De Motu Cordis*" was published in Frankfort. His discovery was quickly accepted in England, Holland and in Germany; but such was the temper of the time, the respect paid to and the fascination of the opinions of the ancients, that almost an hundred years elapsed before it was admitted in Italy, the southern part of France or by the acknowledged master-teachers in medicine of the University of Paris; for we find a certain Vigerius, professor of medicine at Montpellier, still teaching the Galenic ideas as late as 1694, while his colleague of the same faculty, Dionis, was demonstrating its truth at the Royal Garden in Paris, by command of Louis XIV and at the same time it was being denied in the same city, under the lingering influence of Riolan, by the Faculty of Medicine of that center of learning.

In view of the absence of any speedy means of communication between nations at the time when this discovery was published, it is with astonishment that we observe how quickly information in regard to it was transmitted throughout Europe.

Its acceptance by the master minds of medicine, with but few exceptions, was very rapid. The foundations of medical belief were shaken as they had never been shaken before, and on every side men arose, armed with this first of physiological facts, who were only too ready to use it for the purpose of clearing away the banked clouds of theory which, up to that time, had obscured the vision of the medical world from any sane perception of rational methods of treatment of disease.

Hope was high in every breast that through this knowledge disease and its cure might be approached with confident tread. Alas! these hopes were to be dashed to the ground because of too sanguine anticipations, the result of the lack of other facts that were to be learned only through experience, or by the gradual evolution of instruments of precision, used as aids to the acquirement of collateral and related knowledge.

No discovery or discoverer is great enough to be beyond the range of shafts of doubt or envy, and it was so in the case of Harvey. Hardly had his discovery been noised abroad, before there arose a number of detractors whose purpose it was to prove by what seemed to them sufficient evidence that the knowledge of the circulation was as old as civilization.

An attempt was made to show by the testimony of a work by Père Halde, put into Latin by Michael Boym and published by Andreas Cleyer of Cassel, and Batavia in Java, that the circulation was understood by the Chinese at a time 4000 years before the Christian era, and later Cleyer wrote a book ("*Specimen Medicæ Sinicæ*," Frankfort, 1682) in one chapter of which,

"Tractatus de Pulsibus," this claim is maintained. It will not be without interest for any one desiring to go further into this matter, that the article on Chinese medicine by Neuburger, Vol. I, and Renouard

sition the meaning of the text as it appears in the Douai version of the Vulgate, "Before the silver cord be broken, and the golden fillet shrink back, and the pitcher be crushed at the fountain, and the wheel be broken upon the cistern." (Eccl. xii, 6.)

To the writer it would seem that these men must have been possessed with most marvelous capacity for engendering conceptions based upon unwarranted imaginings.

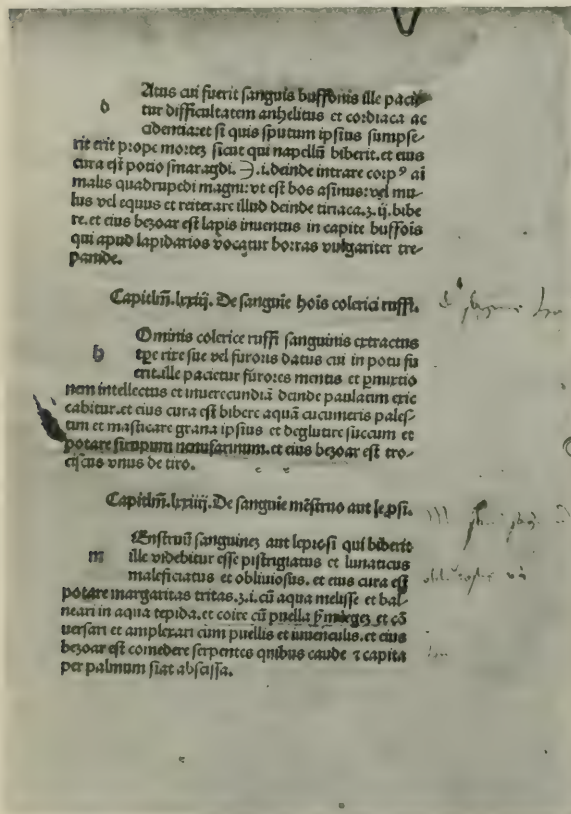
In investigating this matter it seemed so far beyond possibility that such deductions should be drawn from this text, that, fearing that a misprint may have led me astray, I took pains to discover what might have been written in the book of Ecclesiasticus, of Jesus Son of Sirach, which appears in the Vulgate but not in the St. James version. The citation as given in English reads: "Do good to the humble, and give not to the ungodly: hold back thy bread, and give it not to him, lest thereby he over-master thee." Which seems to be very good practical advice, but hardly applicable to the problem of the knowledge of the circulation.

It would take too much time for the reader to enter upon the various claims for the discovery, on behalf of Cesalpinus and Sarpi, nor is such a digression desirable in this article, but it may not be without interest

at this point to note some of the ideas entertained among the ancients as to the use of blood as a remedy, or as to the effects of the abuse of the blood, as in certain cases of perversion.

I quote from Petro de Abano ("De Venenis," circa 1250-1316, Editio Jacobus Thanner, Liptzen, 1498, Cap. 74, "De Sanguine Menstruo aut Leprosi.")

"He who drinks of menstrual blood or



Specimen Page from "De Venenis"

("Hist. de la Médecine," Tome I., fol. 46 et seq.) should be investigated.

Again: Conrad Victor Schneider ("Diss. de Catarrhis," 1664, Cap. 2) and Johannes Schmidius in his work ("Descriptio Senectutis Regis Salomonis") endeavored to show that King Solomon, among the other evidences of his great wisdom, was acquainted with the mystery of the circular movement of the blood, taking as proof of that propo-

of that of a leper, will be seen to be distracted and lunatic, evil minded and forgetful, and his cure is to drink of daisies, powdered and mixed with water of honey, and to bathe in tepid water, and to copulate with girls according to the law natural, and to play with pretty girls and young boys: and the antidote (bezoar) is to eat serpents whose heads and tails have been cut off with the edge of a palm frond."

Pliny ("Natural History," fol. 498, v. 9) describes the drinking of the flowing blood of gladiators in the arena "as if out of living cups," for epilepsy.

Again Pliny states that "a man's own blood rubbed upon himself will relieve him of pain." (Fol. 501, v. 2.)

Again Pliny, as does Diodorus Siculus, describes the employment of baths of human blood by the Egyptian kings as a cure for elephantiasis. (Fol. 469, v. 49.)

The use of blood as a remedy is mentioned in many other places in Lib. XXII.

In Thomas Bartholin's famous book, "De Sanguine Vetito" (Frankfort, 1673), we shall find numberless instances of the use of blood as a remedy, many of the stories being not without humor as, for instance, in that portion in which he treats of the use of the blood of cats, doves, turtles and other animals in the treatment of epilepsy, he tells of a certain girl, an epileptic, at Breslau, who, after taking cats' blood, was quickly endowed with the characteristics of a cat. She climbed upon the roofs of the houses, imitating the manners of cats in voice, jumping, scratching, yowling, and even sitting for hours gazing into a hole in the floor.

Ettmüller gravely informs us, upon the authority of Hildesheim ("Spicilegium," VII, p. 609) that if a black cat's tail be cut off at the distal third, and the first three drops of blood that exude be given to an epileptic, it will prove a powerful means for cure, but he considers the blood from a

wild cat to be more potent. However, blood from the ear of a black cat is most valuable in the treatment of erysipelas.

The ancient pagans advocated the use of the blood not only of brutes, but also of human beings in the treatment of epilepsy.

Scribonius Largus (Comp. XVI) says: "A simple woman, one of the common people, sold as a valuable remedy and a secret one, the mixed blood of a turtle and a pigeon — as much as would flow out — as a certain cure for this disease (epilepsy), which seems to have been as mysterious a malady then as it is to-day."

Paulus Ægineta ("De Re Medica," Lib. VII, Cap. 3) advises the use of the mixed blood of many animals for this disease and Galen and Dioscorides also, the drinking of the blood of a weasel, or the blood of a dog for the cure of the bite of one that was rabid.

Cælius Aurelianus (Lib. I, Chronic., Cap. 4, Editio Amsterdam, 1722, fol. 314) ridicules the use of the mixed blood of men, seals and turtles for the cure of epilepsy, and says, "from this remedy none reaches a cure." Among the Norwegians from time immemorial the blood of seals and whales has been used as a remedy for fits and scurvy, and the blood of the reindeer is used in Lapland for the same purpose.

Artæus (Lib. I, "De Cur. Diut. Morb.," Cap. 4) describes the manner of filling a vial with the blood flowing from the wounds of the soldiers, that it might be drunk as a remedy, and says: "Oh what a mighty necessity, that any one should be forced thus to cure one evil by the use of a greater."

Nicolaus Marepsus (Sect. I, "De Antidotis," c. 439) advised the use of the mixed blood of kids, geese, and male and female ducks for a number of diseases affecting the "spirits." Celsus (Lib. III, Cap. 23) deplores the custom of the people who rushed into the arena at the time of the gladiatorial games to drink the blood fresh-flowing from the jugular veins of the dying

victims, and Tertullian ("Apolog.", IX) asks, "Where are those who at the shows in the Arena, where men are slaughtered, drank the flowing blood (but not that from the throat) with eager thirst, that they might be cured of epilepsy?" Here we have a reference to the danger of taking in any portion of the "spirit" of the bleeding man in the froth of his blood. There can be but little doubt of the use of distillates from the blood, for we shall find in the "De Distillatione" of Hieronymus Rubæus (1585) a full description of its use on pages 123-127 *et seq.*, and the distillate of blood was often employed combined with the waters and oils extracted by distillation from human and other feces for many diseases.

One might well quote from Dioscorides, Galen, Alexander of Tralles, Benedictus Victorius, Mizaldus, Levinus Lemnius, Avicenna and a long list of others, but what has gone before is quite enough to prove a multitudinous use of blood as a remedy.

About the use of blood hung always the idea that it was the container of the various spirits, and that therefore it might be, if rightly chosen or confected, of use as a restorative in cases of maladjustment of those mythical factors when they were disarranged. Indeed we may well imagine that in its use, as well as in the employment of the crushed testicles of goats, asses, rabbits and cocks, there was some sort of foreshadowing of the organotherapy of to-day. What could be more convincing (if *precedent* were a *proof*) of the value of goats' lymph in the treatment of diminished virility, than the grave and serious statements of the ancients as to these things of applied medicine being *arcana* or *specifics*.

INFUSIONAL SURGERY

There can be but little doubt that the original conception of the possibility of introducing remedies into the blood stream

was the result of reasoning from the knowledge that the vessels might be injected after death, as was done by Mondinus in a certain degree, as early as 1316, at Bologna. This process was developed to a greater extent by Silvius, Eustachius and Vesalius. It is difficult to believe that the theories of Servetus as to the lesser circulation were the outcome of a correct knowledge of the anatomy of the vessels of the lungs, derived from an examination of injected vessels, although at the time he was a fellow student with Vesalius at Louvain under the teachings of Guinter of Andernach he must have known something of the method of exhibiting them.

Whatever may be the truth of this opinion it is certain that the first record of a suggestion of any such method or attempt is to be found recorded as originating in England in the year 1657.

In the transactions of the Royal Society of England, Vol. I, page 96, there is a statement by Robert Boyle, the celebrated physicist and chemist of the seventeenth century, to the effect that early in the year 1657 the idea of the intravenous introduction of medicines was proposed to him by Sir Christopher Wren, the famous architect of the St. Paul's Cathedral in London. This suggestion seems to have remained without fruition up to the year 1664 when Johannes Daniel Major, physician and professor of anatomy and botany at the University of Kiel, a man who was pronounced by his contemporaries as "*perquam eruditus, sed perquam etiam vagus*," published his "*Prodromus a se inventæ chirurgiæ infusoriæ*," in which he narrates the following experiments. (Cap. I, Sec. 4.)

Major's Experiments

1. A large dog was infused with liquid extract of opium one ounce. After half an hour he became stupid and torpid, then he fell asleep and would permit needles to be

thrust through his tongue without resisting, hardly noticing them, and after having slept for two days and one night he recovered.

2. A dog was infused with (Crocī metal-lorum) oxidised sulphuret of Antimony gr. 16, in one ounce of water, not filtered. This brought on vomiting and the following day he died.

3. In another large dog (a mastiff) a very small quantity of the same medicine was infused. Nothing unfortunate happened, and afterwards the same medicine to the ordinary dose, namely, one ounce was given; the dog, like the other, vomited violently.

4. Then with acids a large number of infusions were made, but it was observed that all these coagulated the blood and death quickly supervened; but a few grains of oil of tartar (liquor potassii subcarbonatis) produced only a bright and very red condition of the blood.

5. When a decoction of arsenic in common water was infused up to one ounce, into a dog, death was brought on.

6. In the same manner, when a solution of one half drachm of corrosive sublimate dissolved in water was injected into the crural vein of a strong dog, the dog after a short time passed away.

7. Another dog was injected in the crural vein with nitre (potassium nitras), and nothing happened.

Major made note of the fact that if the dog were injected in the jugular vein he died, but that if a common vein were used for the infusion he usually survived. (Were these deaths by air embolism?)

A large number of experiments were made upon dogs, cats and other animals for the purpose of finding out how far this method of medication might be of use for the benefit of mankind. Although somewhat intoxicated by his enthusiasm for his newly discovered method, Major (or Meyer) was in the end obliged to admit that his

experiments had proved to be of but little value, and that the danger of their action was greater than any benefit derived from them.

Further experiments were made by many investigators, and among others a certain physician of Danzig named Fabricius injected seven grains of resin of scammony, dissolved in three drachms of the essence of guaiac, into the median cephalic vein of a soldier suffering with lues, having indolent ulcers on both legs, a tumor of the right arm, horrible pains in the head, as well as laboring with gummata or nodes upon the bones. "Although the medicine was injected with the greatest care and success," the effect of all these things was that vomiting supervened and the soldier died.

After the time of the suggestion by Sir Christopher Wren and before the appearance of the book of Major a number of propositions in regard to infusion were made in England by Dr. Clark, afterward Physician to King Charles the Second, which are frequently noted in the transactions of the Royal Society.

In the year 1665 appeared the three letters of Carolus Fracassatus of Pisa, written to Malpighi, in which are related his experiments having in view the renewal of the blood after removal of a certain amount of it, for the purpose of "preventing its fermentation, or the depression of its quality," by means of infusion of medicinal substances. This series of letters was published at Bologna. It is clear that Fracassatus was seeking for a specific for epilepsy and that he was greatly hampered in his work by the fact that when he injected spirit of vitriol (sulphuric acid), for some strange reason, the blood of his victim always coagulated and the aforesaid victim died, and post-mortem—*mirabili dictu*—the blood was not found to be entirely concreted, but in the lungs was frothy and slimy, and as the dog died with symptoms of suffocation

and with frothing at the mouth, as well as with ululations, it was thought that these symptoms confirmed the idea that epilepsy was induced by a natural concretion of the blood similar to that induced by the vitriolic spirit injected.

In the year 1661, Johannes Sigmund Elsholz, physician in ordinary to the Elector of Brandenburg, as the result of a dissection (for the purpose of proving the theory of the circulation of the blood) of the body of a woman who had been drowned, came to the conclusion that intravascular injections of medicines ought to be of the greatest and most certain value for the treatment of all diseases. (His book containing his observations, "*Chlysmatica Nova*," was published in 1667.)

The same year, Mauritz Hoffmann, Doctor of Medicine and Public Professor of Anatomy and Botany at Altdrof, taught that in cases of melancholia, epilepsy and other hypochondriacal diseases, the cure lay in the injection of the blood of a "florid youth" into the veins of the patient.

A curious story is related by Ettmüller of a certain nobleman who lived in upper Lusatia (Lausitz in Austria) in the year 1642. Being a great huntsman and having a large number of dogs, the kennel-master found great sport in filling his mouth with Spanish wine and then injecting or blowing it into an opened vein in the leg of one of his dogs through a quill. At other times he used spirits of wine. The wounded vein being then tied, the dogs were made drunk, and afforded great amusement to the owner by their inebriated howlings and actions, and they after a time, like the porter in *Macbeth*, were "cozened into a sleep" to recover from their unwilling bacchanalia. Whether it was his practice when his dogs were sick to treat them for their diseases in the same way with various medicaments, I do not know.

As an evidence of the tendency of the minds of men to run in the same general

direction, it is of interest to note the similarity of method and material employed in the prosecution of the investigations made by experimenters far removed from each other, at a time when communication was slow, and in the absence of any postal or telegraphic arrangements that were in the least degree comparable to those of our era.

We find that even before the book of Major was sent to the press, dogs and cats seem to have been almost invariably the victims of the inquisitive surgeon or private investigator, for there were many such.

In Elsholz' book is given an account of a gentleman—"curiosus in sciencia"—who injected the crural vein of a large dog with one ounce of plain water and who reported that for the space of half an hour the dog licked the wound, and then ran about without apparent disturbance.

Elsholz injected one ounce of Spanish wine into the veins of a dog, and reported that even a large dose did not seem to produce any other effect than to cause a short period of drunkenness.

Schottus infused a much larger amount and states that "after a few minutes the dog staggered about in a drunken manner, and then fell flaccid upon his side and slept for many hours, snoring like a drunken man"; and when he injected one ounce of spiritum vite aureum (tincture of gamboge) as much as would be sufficient for a man, the dog was seen to be feeling badly, to wander about in a state of confusion and then after a lapse of seven hours, to have two very copious dejections.

Elsholz himself infused a large dose of yellow antimonial emetic into a large dog at noon of a certain day. The poor beast had hiccough and frothing at the mouth, was greatly depressed, and lay torpid with snoring respiration, and the second hour after the infusion vomited severely, wandered from one corner of the room to another, and when the night was past was found dead; but in another dog, when two

ounces were infused "the dog vomited up both soul and body." Daniel Boyle injected one ounce of liquid extract of opium into a mastiff. The dog slept, anesthetic, for two days and nights, and then recovered.

In the course of these experiments it was noted that the effect of a drug upon one animal was different from its effect upon another. Thus Boyle the English scientist discovered that the amount of the tincture of opium enough for a dose for a man, was enough to drive a cat into a condition of violent madness like that of rabies; while the same dose given to a dog had but little effect other than to soothe him into a prolonged slumber, and that afterward the dog grew fat.

The injection of a watery solution or dilution of nitromuriatic acid into the jugular and crural veins of a dog quickly caused death, and as we might expect, the body being opened, the blood was found to be coagulated throughout the body in the veins, while in the heart the valves were found to be lacerated or ruptured, and apoplexy of the lungs was seen to have occurred.

Other experiments were made with spiritus nitri (nitric acid) and spiritus vitreoli (sulphuric acid) by Fracassatus and Malpighi, as well as with oleum sulphuris (sulphuretted oil) with the same result. Helmont then began a process of deligation of an area or a limb of a dog, and experimented with acids for the purpose of watching the effect of permitting a slow invasion of the body with the acid. In Helmont's work appears a long account of the post-mortem findings in these cases, but it is hardly worth while for us to go into them at length. It is sufficient to say that the total picture in all these cases is the same in general, as that of the dog, dead of the infusion of the nitromuriatic acid.

Alkalies were then tried and an ounce of the oleum tartari (liquor potassii-subcarbonatis) was infused into a large dog. Im-

mediately he became furious and with whining testified to his pain. The abdomen became inflated and then the subcutaneous tissues, after which he died. An autopsy showed that there was a general coagulation of the blood analogous to that found in the case of the injection of the acid.

An experiment was made to try if by drawing off a certain portion of the blood, and substitution for it of a solution of a drug, better results might be obtained.

With this object in view, a portion of blood was drawn from a large dog and an equal amount of decoction of arsenic in water was substituted. "The poor dog died in the greatest misery, with grave symptoms; coughing, vomiting and with a multitude of dejections both from the bladder and rectum, and with violent convulsions of the body and contortions of the eyes."

A certain German named Garmannus experimented with the desire to see what might be the possibilities of use of the method as a means of introducing antidotal remedies. First he infused a big cat with a small portion of the spirits of Rhenish wine, and as usual the cat was made drunk. Shortly afterward a certain number of drops of liquor narcotici (probably liquid extract of opium) were superinfused; when, oh, horror! the cat fell down in a stupor as if dead. A short half-hour elapsed during which the cat had a continuous discharge of a fluid from the rectum, then a large fluid evacuation took place, and the cat died.

One might prolong the description of the many experiments upon animals, through many pages. But, *Quid moror?*

At the end of his chapter upon animal experimentation in infusional surgery, an old writer of the period has said, "These are those attempts to acquire knowledge which were carried on by the investigators for the benefit of man, upon those martyrs of the anatomists, the dogs and cats."

In Belgium many experiments were made with infusional surgery for the purpose of

establishing methods, not of medication, but of means of feeding through the vessels, for improving nutrition, and for sustaining life by the introduction of nutriment into the blood. None of these was fortunate.

The first methodical efforts at the treatment of disease in man were made by Elsholz in 1664-5.

He treated three soldiers, with their consent (I suspect from the context, that it was forced), by infusion. The first had an ulcer of the leg. The crural vein was opened at a place near the ulcer and by means of a syphon a small quantity of aqua plantaginis was injected.

The next was a man suffering from a continued fever. After having been bled from the median vein, while the vein was still open, a teaspoonful of the distilled water of *Carduis Benedictus*—our old friend—was introduced.

The third suffering from a "scorbutic corruption of the humours," was, in the same manner as the second, infused with a portion of the "water of *Cochlearia*." The results in these cases has not yet been reported. Fabricius, before mentioned, injected the soldier whose case of syphilis has already been mentioned. Also he treated a servant girl of uncertain age, who was a victim of epilepsy, with an infusion made of six grains of jalap dissolved in the spirit of lillium convallium. After a period of severe vomiting she seemed to be otherwise unaffected, and for a number of months remained free from fits. In his report of the experiment, Fabricius says, "Whether or not she was entirely cured, I do not know."

The discussion of the value of this means of medication raged among the medical authorities of the world for more than a quarter of a century, and we find as many names ranged upon the one side of opinion as upon the other.

A list of the names of the men who in

the two decades from 1657 to 1677 argued the question pro and con, reads like a roll-call of the great lights of medicine in the age when experimental medicine was in its infancy. All wrote and each called to his aid for authority upon the ancients, Aristotle, Hippocrates, Celsus, Galen and the Alexandrians, but as it were, among the clash of the many weapons of words, a sudden "silence fell upon the multitude."

Infusorial surgery fell into a state of innocuous desuetude, and was almost forgotten, or was considered as one of the curiosities of medical history.

TRANSFUSIONAL SURGERY

It has been shown that the English were the first to suggest the investigation of the merits of infusional treatment, and it was but natural that the next step, transfusion, but a modification of the former, as a remedial measure should follow, transfusion being but the child of infusion. In this the English were the leaders.

Perhaps no subject in the history of the progress of our profession has caused so much discussion as that of the priority of the venture of the transfusion of blood. I shall endeavor to cover the ground as conclusively as may be in as few words as possible.

We have vague references to what may have been attempts at transfusion in the writers of the Augustan period of Roman civilization. Pliny vaguely mentions it, and a passage of Ovid, in the eighth book of the "*Metamorphoses*," seems to indicate that something of the kind was conceived of, but there is nothing definite about it, as it may also be taken to mean that the blood vessels of the recipient were to be filled by the drinking of blood. I cannot believe anything that was said by Roussel in his citations as to there having been true transfusions in the old days, for those of them that I have investigated are not in

the least proofs of any such operation having been done; therefore we may pass over his pronunciamientos as to the cure of Naaman, the writings of Herophilus, the case of Tanquilla in the time of Tarquinius Priscus, or those which he finds in Celsus and Pliny, Eubages and Apollo (sic) for they are not there. We may safely start in the month of June, 1490, or 1492 at Rome, when blood is said to have been transfused by a Jewish physician, named Abraham Meyre of Balmes, into the veins of Pope Innocent VIII.

The blood was taken—according to the story—from the veins of three boys of ten years of age, to each of whom a ducat was paid. It was introduced into the veins of the Pontiff and he either died or recovered, accordingly as you read the history of his life in Cœnephrius, or De Cormanin. The fact is that about the year 1490, two years before the death of the Pope, he, apparently suffering from Bright's disease, fell into a stupor, and became breathless and pulseless. He was pronounced dead, and the Cardinals gathered together to elect a new Pope. However, the good man could not permit this, and after about 70 hours, recovered consciousness and continued to rule the Church for a period of two years, dying in 1492.

It may be well for us to enter a short distance into a review of what has been written upon this subject. The testimony is most conflicting.

Rafael Sabatini in his "Life of Cæsar Borgia," states that the blood was drawn from three boys. Too much was taken. They all died. The Pope, hearing of this, was horrified and the Jewish physician fled. De Cormanin ("History of the Popes") states that it was "a frightful beverage" and given in the year 1492.

Raynaldus states that the blood was taken "in order that the quack, from this (the blood) might, by chemical art, prepare a distillate for a draught for the Pontiff."

Frederic Baron Corvo believed it to have been a drink of a prepared distillate.

In Leo's "Geschichte von Italien," Vol. IV, p. 618, the historian considers it to have been a transfusion, as does also Pasquale Villari. ("Life of Savonarola.")

Ciaconius and Cœnephrius Panvinus, follow Steven Infessura, a contemporary of the Pope, whose statement will be seen in a later paragraph.

Gregovorius ("Geschichte der Stadt Rom im Mittelalter," Vol. VII, p. 279) states that the blood was transfused.

All of the beforementioned writers refer in one way or another to Infessura. Let us see exactly what he says.

Steven Infessura in his "Diaria Rerum Romanorum" (quoted in "Fonti per la Storia d'Italia," pages 275-6):

"Interea in Urbe nunquam cessaverunt tribulationes et mortes; nam primo tres pueri decem annorum, e venis quorum Judæus quidam medicus qui papam sanum reddi promiserat sanguinem extraxit, incontinenti mortui sunt. Dixerat namque Judæus se ville sanare pontificem, dummodo habere posset certam quantitatem sanguinis humani et quidem juvenis; quem propterea extrahi jussit a tribus pueris, quibus post flebotomiam unum ducatum pro quodlibet donavit; et paulo post mortui sunt. Judæus quidem aufugit, et papa sanitus non est."

This, in English, is about as follows:

"Nevertheless the deaths and distress in nowise ceased; for three boys of ten years of age from whose veins a certain Jewish physician, who had promised to save the Pope's life, drew the blood, died incontinently. For the Jew said that in order to cure the Pontiff, it was necessary to have a certain quantity of blood, and that it must be drawn from young people, for which reason it was ordered to be drawn from the veins of three boys, to

each of whom, after the phlebotomy, a ducat was given, and shortly after they all died. The Jew, of course, fled, and the Pope was not cured."

There is no assurance that the Holy Father ever received either the transfusion or the drink. There is nothing in regard to any new instrument, no account of any air embolism, nothing whatever from which either conclusion may with certainty be drawn.

It may be that whatever was done was at the time when the Pope was in the state of uremic coma, in 1490.

It only remains to investigate as to what was really accomplished. It is hardly probable that there was any interchange of blood between the boys and the Pontiff. The following facts seem to stand out of the jumble of reports. There was a Pontiff. There was a quack doctor, a Jewish pharmacist. There were three boys who were bled, and who were paid a ducat apiece for their blood. They died before they had time to spend the money. The "*Judæus aufugit*" before the Pope had a chance to get his drink (or was it a transfusion?), for the pharmacist did not tarry to concoct it. The Pope died. The reader may take his choice as to what it was.

An hundred and twenty years elapse before we come to anything that seems definite as to transfusion, and that instance is found in a rather satirical collection of statements derived from a thousand sources by a certain Andreas Libavius (1546-1616), who, having written an extensive book upon chemistry and chemical medicine, sought to defend his postulates, against his critics, by gathering together the various curiosities of theory in regard to cures, from every source, and in the course of this process introduces a perfect description of a transfusion, at a period even before the announcement of the discovery of the circulation by Harvey.

This book of Libavius was published at Frankfort in 1615, hence it must have been before that date that the transfusion described took place, if it was done at all.

It is to be remembered that Harvey first lectured to his students at St. Bartholomew's Hospital upon his theory as to the circulation, in the year 1613. (Dezeimeris, Dict., Tome 3, Part 1, fol. 56.) The book of Libavius, "*Syntagma Arcanorum Medicorum*," was somewhat of a firebrand to the Galenists, the Hermetics and the followers of Paracelsus, and was at once attacked most virulently, especially by Scheunemann, and in reply to this attack he published his "*Defensio Syntagmatis*," in which the passage occurs. After reciting a number of the ridiculous methods of the Paracelsians, and citing the miracles of Elisha and Elijah, as well as the story of David and the young woman who was sent to him to restore his vitality (I Kings i, 3), he says:

"*Sed Eliæ et Elisæi potentia non successit MEZENTIO, qui mortuos non restituit applicatis vivis, sed hos occidit. Ille vero noster quo quæso remedio putabat se ista insperata consequi posse? Assit juvenis robustus, sanus, sanguine spirituosus plenus. Astet exhaustus viribus, tenuis, macilentus, vix animam trahens. Magister artis habeat tubulos argenteos, inter se congruentes. Aperiat arteriam robusti et tubulum inserat muniatque: mox et ægroti arteriam lincat, et tubulum fœmineum infigat. Jam duos tubulos sibi mutuo applicet, et ex sano sanguis arterialis, calens, et spirituosus saliet in ægrotum, unaque vitæ fontem afferet, omnemque languorem pellet. Sed quomodo ille robustus non languescet? Danda ei sunt bona confortantia et cibi: medico vero helleborum.*"

Which being put into English is as follows:

"But the powers of Elisha and Elijah did not descend to MAZENTIUS, since

he could not restore the dead to life by application of the living to the dead, but on the contrary he killed them. Was he not that man among us who thought that by employing the following most unusual procedure he might bring about that result? 'Let there be a young man, robust, full of spirituous blood, and also an old man, thin, emaciated, his strength exhausted, hardly able to retain his own soul. Let the performer of the operation have two silver tubes fitting into each other. Let him open the artery of the young man and put into it one of the tubes, fastening it in. Let him immediately after open the artery of the old man, and put the female tube into it, and then the two tubes being joined together, the hot and spirituous blood of the young man will pour into the old one, as if it were from a fountain of life, and all of his weakness will be dispelled.

"Now, in order that the young man may not suffer from weakness, to him are to be given good care and food, but to the Doctor, hellebore.")"

(I cannot imagine why the Medicus should need hellebore, but perhaps it was on the principle that a *veratrum* cock-tail might reduce his blood-pressure after his exciting experiment.)

Contrary to what has been advanced by many historians of medicine, I cannot find in any of this the slightest intimation that Libavius either advocated or performed this operation of transfusion. A certain Mazentius seems to have been the man who suggests the method. It will be noted that two arteries are to be used. This alone would indicate that Mazentius had no conception of the circulation, and that his idea was that the blood would rush into the old man because of the greater pressure of the spirits in the young man. I cannot believe with Dr. Garrison ("History of Medicine," p. 144) that Libavius was an advocate of

transfusion. Rather he seems to be casting ridicule upon the experiment.

Now who was this man Libavius whose statement has been a sort of stumbling block to the solution of priority in the performance of transfusion. One writer speaks of him as "being *vir scribendo prolixus, sed insignis scoticus et scepticus*." As to his prolixity—I show you a page of his writings whereon appears the extract above translated. He surely was energetic and learned, as well as skeptic, and a very good business man withal, for we learn from Garrison ("Hist. of Medicine," p. 144) that he had at Coburg a large establishment, a private laboratory, and his quarters were furnished with rooms for patients, a gymnasium, baths, enclosed corridors for exercise in cold weather, and a well-stocked wine-cellar. He was the great chemist of his time and was the discoverer of stannic chlorid. His nomenclature of many chemicals remains in use to this day.

It is certain that Johannes or Giovanni Colle, of Belluno, in Italy, who was Professor of Medicine at Padua, Physician to Cosimo II of Florence, and who wrote extensively upon *Morbus Gallicus*, described a method of transfusion in a medical tractate at a period anterior to the year 1628, as his book, in chapter seven of which he gives the account, "*Methodus Facile Procurandi Tuta, et Nova Medicamenta*," appeared at Venice in that year.

There was a little book published about 1660, in Italy, that bears the title—when put into English—"A Pair of Medical Scales, in Which Are Weighed Not Only the Infusion of Medicines and Other Novelty, but also the Favorable and Unfavorable Opinions as to the Transfusion of Blood."

This book was written by one Francesco Folli, a native of Poppi, born in 1624. He practiced medicine in various cities and provinces of Italy and was, about 1650, called to Florence to become body-physi-

cian to the daughter of the Duke, Cosimo II. In his book he shows that he was familiar with the theory of the transfusion of blood, that he had developed a technique of his own and had had instruments made for that purpose. He states that he demonstrated the operation of transfusion in the year 1654 in the presence of the Grand Duke Frederick II. This would have been 11 years before the operation was done by Richard Lower, the English surgeon. In the year 1766, a book was published in Florence entitled "A Series of Portraits of Distinguished Tuscan Men." In this publication there appears a portrait of Folli and a pictorial reproduction of the instruments invented by him.

Folli proposed to employ a silver tube inserted into the artery of the donor, and a cannula of bone into the vein of the recipient, and to connect the two by means of a hollow pipe made from a blood-vessel taken from an animal. This tube was provided with a lateral branch that permitted the escape of the air as the blood poured through it from the artery toward the vein. It would seem that but for his lack of knowledge of hemolysis, Folli was practically as well prepared to do the operation as we are to-day.

I now quote from Roussel.

"In France they had not dared to attempt arterial transfusion, for the reason that in opening the carotid artery of the donor, his life was inevitably sacrificed. In 1653 Robert des Gabets, a monk of Cluny, demonstrated the possibility of performing intravenous transfusion, which he designated 'communication,' by means of two little tubes of silver which he had manufactured at Maçon in 1651 under the direction of another monk, Dom Eloy Pichot. These tubes were connected by a leather ball the size of a walnut, and each contained a valve to regulate the flow of the blood. By

compressing the ball the necessary force was communicated to the venous blood to make it penetrate, and the quantity of blood could be measured. The ideas incorporated in the construction are the same as are demonstrated in the most modern apparatus for direct transfusion to-day." (1880)

We are now approaching the date of the first visual demonstration of the actual flow of the blood from the arterial into the venous side of the circulatory system, for it was not until 1661 that Malpighi saw the passage of the corpuscles of blood through the capillaries in a frog's foot, and by that vision supplied the final link to the chain of evidence proving the truth of Harvey's theory.

You will remember what I have said in an earlier portion of this paper as to the first suggestion of the infusorial surgery by Sir Christopher Wren in 1657. During the period following that suggestion the experiments along that line were followed, as I have shown you, for a period of eight years before any attempt was made to transfuse blood from one animal to another. Then "in the year 1665, toward the end of February," as says the author of "The Gold Headed Cane," "Richard Lower made this experiment at Oxford; by means of long tubes, the blood of the vertebral artery of one dog was made to pass into the jugular vein of another, and it appeared proved that there was no reason to fear any mischief, and that the character or nature of one animal was not likely to be changed by injecting into its veins the blood of another."

Whatever may have gone before, whether it be the work of Abraham Meyre of Balmes, the operation described by Libavius, the efforts of Folli, or the instruments of the Monks of Cluny, the date of the demonstration by Lower is the starting point of the long series of transfusional ex-

periments upon animals, by a multitude of learned men all over Europe, leading up to the triumphant experiment of Dionis of the Faculty of Montpellier, in Paris, of direct transfusion of the blood of an animal into man.

But before we go into the matter it will be well to quote once more from "The Gold Headed Cane" and tell a little story that is not without interest. ("The Gold Headed Cane," p. 97.)

Dr. Mead is made to say, "So late as the middle of the seventeenth century, about the time when Lower was making at Oxford the daring and original experiment of transfusion (of the blood), a grave dispute arose in Germany as to the position of the heart itself. The contest was terminated at length by the Professors of Heidelberg, where the question was agitated: having recourse to the delicate experiment of killing a pig in the presence of the Margrave of Baden-Durlach, and clearly proving to His Highness, who then labored under palpitation of the heart, that it really was situated on the left side of the thorax.

"The result of this important discovery was fatal to the fortunes of His Highness' physician, who, though he stoutly maintained by a refinement of courtly flattery that the heart of his master could not have a position similar to that of a pig, was dismissed in disgrace."

In Samuel Pepys' Diary, under date "Nov. the 14th, 1666," we find the following reference to the work of Lower:

"Dr. Croone told me that at the meeting at Gresham College to-night (which, it seems, they now have every Wednesday again), there was a pretty experiment of the blood of one dog let out (till he died) into the body of another on one side, while all his own run out on the other side. The first died upon the place, and the other very well, and likely to do

well. This did give occasion to many pretty wishes, as of the blood of a Quaker to be let into an Archbishop, and such like; but, as Dr. Croone says, may if it takes, be of mighty use to man's health, for the amendment of bad blood by borrowing from a better body."

It will be seen that the experimental forms of transfusion took three classifications.

First, From brutes to brutes.

Second, From brutes to man.

Third, From man to man.

The particular objects that were believed to be worthy of an effort at transfusion were as follows. (I quote from an old authority, Ettmüller):

"To correct a vicious condition of the blood.

To prolong the lives of the aged.

The cure of Melancholy delirium.

The eradication of Scurvy.

The cure of Consumption.

The mitigation of Arthritis.

The removal of Epilepsy.

The amelioration of Scabies and Leprosy.

The restitution of diminished strength, as well in the young weakened by disease, as in the aged worn out with years.

For the alteration of the habits of people of evil disposition.

For the solution of calculi produced by a tartarous state of the blood."

It is needless to say that none of these objects was accomplished. Pierre Dionis, one of the surgeons to the Dauphin of France, son of Louis XIV, after a multitude of experiences made in the transfusion of blood from animal to animal, with varying results, in the month of June, 1667, made the following experiment. This was the first instance, properly recorded, of the transference of blood directly into the veins of a

human being from the arteries of an animal.

Thanks to the willingness of a certain strong and robust porter, Dionis was allowed, first to remove from the median vein of the man 10 ounces of blood, and immediately afterward the vein was connected by means of a tube with the crural vein of a lamb and twenty ounces of blood was poured into the circulation of the porter. Dionis paid the man and he at once went to an inn and ate and drank.

The experiment was repeated upon the man a number of times without harmful result. It is to be noted that the man was in good health.

The next instance of transfusion was that of the introduction of blood into a sick man, the result not being as fortunate. The case is well worthy of complete rehearsal.

"In Paris there was a boy of ten years of age who was suffering from a long continued tertian fever, weakened by continuous clysters and a vast number of bleedings, brought to a state of complete lethargy by the depauperation of the spirits, and whose life and intellect were reduced to the lowest ebb. For the relief of these conditions, and to improve the thickness of the blood and to increase its spirituousity, transfusion was attempted, but the boy being corrupted by his feverishness and his diarrhea, three ounces of thick, coarse and blackish blood were taken from him, and then eight ounces of blood from the carotid artery of a lamb were transfused into the vein. The boy soon felt better, took food, moved about and slept during the middle of the day; but after 24 hours he was again attacked with diarrhea and coma, and died."

In the month of December, 1667, Dionis transfused five ounces of the blood of a calf into the veins of a man suffering from mania

and melancholia, after he had been bled to the amount of three ounces. This seems to have had a good effect upon the patient, but we do not learn that his improvement was permanent.

On November 23rd, 1667, Lower had attempted the same thing at Arundel House, upon Mr. Arthur Coga, "a mildly melancholy insane man," with the blood of a lamb, without mishap, but without any specially favorable result. The experiment was to have been repeated, but for some reason not stated, it never was. After the operation, Coga stated that he felt himself better.

There is no doubt that Lower would have gone on with his work to the final test to transfusion of blood from man to man, but that the law and local prejudice prohibited such an operation.

The work begun by Lower and Boyle attracted the attention of many philosophers and physicians in England and on the Continent, and we find them being repeated with many variations by King, Coxé and others in England, by Dionis and Gayen in France, by Graaf and others in Germany and Cassini in Bologna.

Reports of all these efforts are to be found in the Transactions of the Royal Society.

Similar experiments were carried on in Italy at Rome, by Guillelmus Riverius or Riva, of Montpellier.¹ The following case, reported by him, is not without interest, in that it is probably the first instance recorded, possibly, of hemolysis.

It is not to be wondered at that, since these experiments in infusion and transfusion were in progress at a time when there was no possible chance that there could be any true knowledge of the

¹ The context in the report of this case makes it rather doubtful as to the city at which it was done, but it would seem that it was done either by Guillelmus Riva, who was a well known surgeon at Rome, or by Dionis at Paris.

histology of the blood, there should have been accidents of this kind, and that through the occurrence of a number of them the method of treatment fell into disrepute. The case is as follows:

"There was living at that time in Paris a certain Swedish Baron named Bond, who was sick with a peculiar continued miliary fever of a light form, which was complicated by a colliquative diarrhea with bloody discharges from the bowels, indicating an hepatic complication.

"The man had been bled 32 times, but nevertheless his strength was failing and he was approaching death, the disease being so long drawn-out.

"Now when he was in an half-dead condition, a transfusion of a great number of ounces of blood from a calf was made into his veins.

"The pulse immediately became stronger to the touch, and after two days he was so much improved that he was able to speak, but after the lapse of two more days he suddenly died. An autopsy having been made, it was found that in the whole of his body and vessels there was not to be found blood to the amount of a teaspoonful."

Was this a case of hemolysis from the use of a blood that was lytic to that of the recipient? The intervening time between the immission of the blood and the death would seem to be too long, yet the possibility of hemolysis having taken place is not improbable.

As to the question of priority of transfusion from animal to animal, and animal to man, the matter is made clear in the following table.

It is very likely that experiments both in infusion and transfusion were made as early as 1660 by Wren, Richard Lower and Boyle, at Oxford.

It is certain that transfusion from ani-

mal to animal was done by Lower and Boyle at that city in February, 1665.

On May 17th, 1665, Lower made his demonstration of transfusion by means of quills, from dog to dog, before the Royal Society in London.

Pierre Dionis, at Paris, had been experimenting in infusional surgery during the year 1665 and 1666, and his letter in regard to his experiments appears in the *Transactions of the Royal Society*, No. 25, May 6th, 1667. He had also done some work in the way of transfusion on animals, as for instance the transfer of the blood of four goats into the veins of a 26-year-old horse, with success.

In the month of June, 1667, Dionis made his first transfusion from an animal to a healthy man. This experiment was repeated either in July or August of the same year by him, the recipient being a sick boy.

In November 23d, 1667, Lower transfused the blood of a sheep into the veins of one Arthur Coga.

In December, 1667, Dionis transfused the blood of a calf into the circulation of man suffering from mania and melancholy.

The correct description of the method employed by Lower in his epoch-making demonstration is taken from the records of the Royal Society of London (*Philosophical Transactions*, Vol. I, Monday, Dec. 17th, 1666, page 353).

"The method observed in transfusing the blood out of one animal into another. It was first practised by Doctor Lower in Oxford, and by him communicated to the Honorable Robert Boyle, who imparted it to the Royal Society as follows:

"First take up the carotid artery of the dog or other animal whose blood is to be transfused into another of the same or a different kind, and separate it from the nerve of the eighth paire, and lay it bare above an inch.

"Then make a strong ligature on the

upper part of the artery, not to be untied again; but an inch below, videlicet, towards the heart, make another ligature of a running knot, which may be loosened or fastened as there shall be occasion. Having made these two knots, draw two threads under the artery between the two ligatures, and then open the artery and put in a quill, and tie the artery upon the quill very fast by those two threads, and stop the quill with a stick. After this make bare the jugular vein in the other dog about an inch and a half long, and at each end make a ligature with a running knot, and in the space betwixt the two running knots draw under the vein two threads as in the other. Then make an incision in the vein, and put into it two quills, one into the descendent part of the vein to receive the blood from the other dog and carry it into the heart, and the other quill put into the other part of the jugular vein which comes from the head (out of which the second dog's own blood must run into dishes).

"These two quills being put in and tyed fast, stop them with a stick till there is occasion to open them.

"All things being thus prepared, tie the dogs on their sides towards one another, so perfectly that the quills may go into each other (for the dogs' necks cannot be brought so near but that you must put two or three several quills more into the first two to convey the blood from one to another).

"After that unstop the quill that goes down into the first dog's jugular vein and the other quill coming out of the other dog's artery, and by the help of two or three other quills put into each other according as there shall be occasion, insert them into one another. Then slip the running knots, and immediately the blood runs through the quills as through an artery, very impetuously. And im-

mediately as the blood runs into the dog unstop the other quill, coming out of the upper part of the jugular vein (a ligature being first made about his neck, or else his other jugular vein being compress'd by one's finger), and let his own blood run out at the same time into dishes (yet not constantly, but according as you perceive him able to bear it, till the other dog begins to cry and faint and fall into convulsions, and at last dye by his side).

"Then take out both the quills out of the dog's jugular vein and tie the running knot fast and cut the vein asunder (which you may do without any harm to the dog, one jugular vein being sufficient to convey all the blood from the head and upper part by reason of a large anastomosis, whereby both the jugular veins meet about the larynx). This done, sew up the skin and dismiss him and the dog will leap from the table and shake himself and run away as if nothing ailed him.

"There are many circumstances necessary to be observed in the performing of this experiment. . . . Secondly, that you constantly observe the pulse beyond the quill in the dog's jugular vein (which it acquires from the impulse of the arterious blood). For if that fails, then 'tis a sign the quill is stopt by some congealed blood, so that you must draw out the arterial quill from the others, and with a probe open the passage again in both of them, that the blood may have its free course again. For this must be expected when the dog that bleeds into the other hath lost much blood his heart will beat very faintly, and then, the impulse of the blood being weakened, it will be apt to congeal the sooner, so that at the latter end of the work you must draw out the quill often and clear the passage. . . .

"The most probable use of this experiment may be conjectured to be that one

animal may live with the blood of another, and consequently that those animals that want blood or have corrupt blood may be supplied from others with a sufficient quantity, and of such as is good, provided the transfusion be often repeated, by reason of the quick expense that is made of the blood."

Here the scientific Mr. Boyle comes into the matter with certain, "Tryals proposed by Mr. Boyle to Dr. Lower to be made by him for the improvement of transfusing blood out of one live animal into another." (*Philosophical Transactions*, Monday, February 11, 1667, page 385, Vol. I.)

"The following quæries and tryals were written long since, and read about a month ago in the Royal Society, and so now come forth against the author's intention, at the earnest desire of some learned persons, and particularly the worthy doctor, to whom they were addressed, who thinks they may excite and assist others in a matter which to be well prosecuted will require many hands. At the reading of these the author declared that of divers of them he thought he could foresee the events, but yet judged it fit not to omit them, because the importance of the theories they may give light to, may make the trials recompense the pains, whether the success favours the affirmative or negative of the question, by enabling us to determine the one or the other upon surer grounds than we could otherwise do. And this advertisement he desires may be applied to those other papers of his that consist of quæries or proposed tryals."

The queries themselves follow:

"1. Whether by this way of transfusing blood the disposition of individual animals of the same kind may not be much altered (as whether a fierce dog, by being often quite new stocked with

the blood of a cowardly dog may not become more tame, or vice versa).

"2. Whether immediately upon the unbinding of a dog, replenisht with adventitious blood, he will know and fawn upon his master, and do the like customary things as before; and whether he will do such things better or worse at some time after the operation.

"3. Whether those dogs that have peculiarities will have them either abolished or at least much impaired by transfusion of blood.

"4. Whether acquired habits will be destroyed or impaired by this experiment.

"5. Whether any considerable change is to be observed in the pulse, urine, and other excrements of the recipient animal by this operation, or the quantity of his insensible transpiration.

"6. Whether the emittent dog being full fed at such a distance of time before the operation that the mass of blood may be supposed to abound with chyle, the recipient dog being before hungry will lose his appetite, more than if the emittent dog's blood had not been so chylous.

"7. Whether a dog may be kept alive without eating by the frequent injection of the chyle of another, taken freshly from the receptacle into the veins of the recipient dog.

"8. Whether a dog that is sick of some disease chiefly imputable to the mass of blood may be cured by exchanging it for that of a sound dog; and whether a sound dog may receive such diseases from the blood of a sick one as are otherwise of an infecting nature.

"9. What will be the operation of frequently stocking (which is feasible enough) an old and feeble dog with the blood of young ones as to liveliness, dullness, drowsiness, squeamishness, &c., and vice versa?

"10. Whether a small young dog by

being often fresh stockt with the blood of a young dog of a larger kind will grow bigger than the ordinary size of his own kind.

"11. Whether any medicated liquors may be injected, together with the blood, into the recipient dog. And in case they may, whether there will be any considerable difference found between the separations made on this occasion and those which would be made, in case such medicated liquors had been injected with some other vehicle, or alone, or taken in at the mouth.

"12. Whether a purging medicine being given to the emittent dog a while before the operation, the recipient dog will be thereby purged, and how.

"13. Whether the operation may be successfully practised in case the injected blood be that of an animal of another species, as of a calf into a dog, and of cold animals as of a fish, or frog, or tortoise, in the vessels of a hot animal, and vice versa.

"14. Whether the colours of the hair or feathers of the recipient animal, by the frequent repeating of this operation will be changed into that of the emittent.

"15. Whether by frequently transfusing into the same animal of another species, something further and more tending to some degree of a change of species may be effected at last in animals near of kin (as spaniels and setting dogs, &c).

"16. Whether the transfusion may be practised upon pregnant bitches, at least at certain times of their gravitation, and what effect it will have upon the whelps."

his transfused patients, but he proved himself innocent, and the court, while it acquitted him, prohibited further experiments with human beings as subjects, except with the consent of the Faculty of the University, and then they were to be done only by a registered physician of that city.

The many accidents and deaths that followed these experiments and the divided opinion of the Faculties of the various countries of Europe quickly attracted the attention of the different governments to the work being done by the experimenters, and in France, transfusion was prohibited by an edict of the Parisian Parliament. However, experiments upon dogs or other animals were not frowned upon in that country.

Further progress in the investigation of the transfusional surgery was brought to a stand-still in almost all parts of Europe by a special edict of the Pope at Rome about the year 1678.

One might go deeply into a consideration of the various conclusions arrived at by the wise ones of that generation as to the value of this method of treatment.

There seems to have been as many opinions as there were investigators, and no common opinion among them. This was but natural at a period when so much was yet to be learned as to the physiology of the blood, chyle and lymph,—their circulation and purposes.

The whole proposition fell into oblivion and almost a century and a half elapsed before interest was again awakened in the question. But that is a matter beyond the meaning of the title of this essay. I leave it for others to investigate.

In Paris, Dionis was arrested and brought before a court, accused of murder of one of

THE LEGISLATIVE AND ADMINISTRATIVE HISTORY OF THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY DURING THE REVOLUTIONARY PERIOD (1776-1786)

By COLONEL WILLIAM O. OWEN, U. S. ARMY

CURATOR, ARMY MEDICAL MUSEUM, WASHINGTON, D. C.

SO far as I have been able to acquire it, the original method of caring for the sick and wounded in the Revolutionary War, which is the beginning of our medical history, was to employ individual medical men wherever they might be found to take care of the sick or wounded who happened to fall in some particular fight in their locality.

Little by little the generals in command, the Provincial Congresses of the colonies, and the Continental Congress of the United Colonies had medical matters forced upon their attention by the numerous bills coming in from doctors, here, there, and everywhere that there had been a battle. The Provincial Congresses and the Continental Congress had a number of medical men in their memberships, and in looking over the histories of this date we find constant references to them. Among those who were found in the legislative bodies of Massachusetts was Dr. Benjamin Church. He was afterwards sent as a member to the Continental Congress itself. He and three other doctors formed the first Army Medical Examining Board of which we can get any history, for I find in the *Journal of the Provincial Congress of Massachusetts*, 1775, p. 203, that on May 8th, 1775, this Congress

"Ordered, That the President pro tempore, Doct. Church, Doct. Taylor, Doct. Helten and Doct. Dunsmore, be a committee to examine such persons as are, or may be, recommended for surgeons for the army now forming in this colony."

and they,

"Resolved, That the persons recommended by the commanding officers of the several regiments, be

appointed as surgeons to their respective regiments provided they appear to be duly qualified upon examination."

In *Thacher's Military Journal*, 1775-1783, on pages 34-35, we read:

"On the day appointed, the medical candidates, sixteen in number, were summoned before the board for examination. This business occupied about four hours; the subjects were anatomy, physiology, surgery and medicine. It was not long after, that I was happily relieved from suspense, by receiving the sanction and acceptance of the board, with some acceptable instructions relative to the faithful discharge of duty, and the humane treatment of those soldiers who may have the misfortune to require my assistance. Six of our number were privately rejected as being found unqualified. The examination was in a considerable degree close and severe, which occasioned not a little agitation in our ranks. But it was on another occasion, as I am told, that a candidate under examination was agitated into a state of perspiration and being required to describe the mode of treatment in rheumatism, among other remedies said that he would promote a sweat, and being asked how he would effect this with his patient, after some hesitation he replied, 'I would have him examined by a medical committee.' "

Thacher was so fortunate as to obtain the office of surgeon's mate in the provincial hospital at Cambridge, the senior surgeon being Dr. John Warren, brother and pupil of the gallant General Joseph Warren, who was slain in the memorable battle on Breed's Hill.

"This gentleman has acquired great reputation in his profession, and is distinguished for his humanity and attention to the sick and wounded soldiers, and for his amiable disposition. Having received my appointment by the Provincial Congress, I commenced my duty in the hospital, July 15th. Several private, but commodious houses in Cambridge are occupied for hospitals, and a considerable number of soldiers

who were wounded at Breed's Hill, and a greater number of sick of various diseases, require all our attention. Dr. Isaac Foster, late of Charlestown, is also appointed a senior hospital surgeon; and his student, Mr. Josiah Bartlet, officiates as his mate; Dr. Benjamin Church is Director General of the hospital."

I find in Thacher's *Military Journal*, 1775-1783, on page 294, the following:

"January 1st, 1781.—On this, the first day of the new year, an arrangement of our army takes place, according to the late resolve of Congress. The supernumerary regiments are to be incorporated with those which continue on the new establishment fixed by Congress, and are to be entitled to the same privileges and emoluments, which are to be allowed to those who continue to the end of the war. It being optional with me, either to retire or to continue in service, I shall retain my commission as surgeon to Colonel H. Jackson's regiment. We are encouraged to anticipate more favorable circumstances, and more liberal compensation, Congress having at length passed several resolves, entitling all officers who shall continue in service till the end of the war, or shall be reduced before that time, as supernumeraries, to receive half pay during life, and a certain number of acres of land, in proportion to their rank. Besides these pecuniary considerations, we are actuated by the purest principles of patriotism; having engaged in the mighty struggle, we are ambitious to persevere to the end. To be instrumental in the achievement of a glorious Independence for our country, and posterity; will be a source of infinite satisfaction, and of most grateful recollection, during the remainder of our days. Notwithstanding the unparalleled sufferings and hardships, which have hitherto attended our military career, scarcely an officer retires without the deepest regret and reluctance. So strong is the attachment, and so fascinating the idea of participating with our illustrious commander in military glory, that a separation is like a relinquishment of principle, and abandonment of the great interest of our native country."

The successive steps in the legislative history of our Army Medical establishment during the Revolution will be found in the following pages, which I have carefully excerpted, from the Journals of each Provincial Congress of the Colony of Massachusetts Bay, and from the twenty odd volumes of the Journals of the Continental

Congress. Buried as they are in these lengthy archives, such records are valueless for medico-historical purposes. Presented here, as purely archivistic material, they are but the crude ore of medical history. Yet this record is undoubtedly the basic material upon which future historians must rely in their work, which is my reason for presenting it. To the medical officer, these records are of exceptional interest; to the patriot they will not seem dry and uninspiring.

Our military medical history began, as we have seen, in the Colony of Massachusetts Bay. In the Journals of the Continental Congress, we trace the prehistory of our present Army Medical Corps, from the appointment of Dr. Benjamin Church as Director General and Chief Physician of our first Army Hospital, at a salary of four dollars a day, to the final acts relating to the reduction of the army in 1783. The subsequent act of June 2, 1784, practically disbanded the U. S. Army, but it was immediately followed by acts of June 3, 1784, April 7, 1785, October 20, 1786, and October 3, 1787, providing for the levying of troops and officers to guard our Northwestern frontier and other localities. These were, however, only militiamen. The U. S. Army proper was still non-existent. Following the appointment of Major-General Henry Knox as Secretary of War, on March 8, 1785, an act of September 29, 1789, authorized the formation of a corps of 700 men, rank and file, to guard the western posts. This force had a medical complement of one surgeon and four surgeon's mates. These forces were enlarged up to their disbandment in the fall of 1791, and on March 5, 1792, our military forces were reorganized as a "Legion" by Congressional enactment, with Richard Allison, as "Surgeon to the Legion," or Chief Medical Officer on the General Staff, at seventy dollars per month, the pay of regimental surgeons (surgeon's mates) being forty-five dollars monthly.

Major General Anthony Wayne commanded the whole Legion, and in August, 1794, fought the decisive battle of Maumee Rapids against the hostile Indians. The Medical Department was enlarged by the acts of May 28, 1798, and March 2, 1799, which, at the earnest request of Washington, provided for the appointment of James Craik of Virginia as Physician General to both the Army and the Navy. Craik served in this capacity from July 19, 1798, to June 15, 1800, when he was mustered out by disbandment of these forces. On March 3, 1813, in the midst of the War of 1812, the office of Physician and Surgeon General was created, and on June 11, James Tilton of Delaware was appointed to this position. With Tilton's appointment, the history of the Medical Corps of our Army, as we now know it, begins.

In the pages immediately following, one may find the legislation relating to the treasonable action of Church, his trial and confinement, the appointment of John Morgan as his successor, the famous act of July 17, 1776, limiting and defining the authority of medical officers, Morgan's dismissal, through his disputes with Shippen and the unsoldierly neglect of duty of Stringer, the appointment of Shippen, Rush, and others, Shippen's trial for malfeasance in office, his acquittal and the resignation of Dr. William Brown, Shippen's resignation, the appointment of Cochran as Director General, and his services up to the disbandment of the Army in 1783. In the different plans considered for organization and reorganization of medical service, in such things as the bits of legislation bearing upon preventive inoculation against small-pox, we get a clear idea of what Congress was actually doing for the medical establishment of the Continental Army.

The main source books for the early history of our Army Medical establishment have been James Tilton's "Observations on Military Hospitals" (1813), the *Military*

Journal of James Thacher (1826), James Mann's "Military Sketches of the Campaigns of 1812-14" (1816), and "The Medical Department of the United States Army from 1775 to 1873" by Harvey E. Brown (1873). It is in the hope of stimulating further interest and research that I add the subjoined record.

I. FROM THE JOURNALS OF THE PROVINCIAL
CONGRESSES OF MASSACHUSETTS BAY
(1775)

April 27, 1775 (A. M.) 160

Ordered, That Capt. Kingsbury, Doct. Holten and Deacon Stone, are appointed to enquire, and endeavor to get an exact account of the men killed, and wounded, and murdered, in the late scene on the 19th instant.

May 8, 1775, 203.

Ordered, That the president pro tempore, Doct. Taylor, Doct. Holten and Doct. Dunsmore, be a committee to examine such persons as are, or may be, recommended for surgeons for the army now forming in this colony.

Resolved, That the persons recommended by the commanding officers of the several regiments, be appointed as surgeons to their respective regiments, provided they appear to be duly qualified upon examination.

May 16, 1775. 232

The committee reported, that Doct. Benjamin Church was chosen.

May 17, 1775. 236

Resolved, That Doct. Church be allowed one servant to attend him in his journey to Philadelphia.

June 2, 1775. 290

Ordered, That Doct. Whiting and Doct. Bailies, be added to the committee which was appointed by the last Congress, to examine those persons who might be nominated for surgeons of the Massachusetts army.

June 12, 1775. 321

Ordered, That Doct. Whiting, Doct. Taylor and Mr. Parks, be a committee to consider some method of supplying the several surgeons of the army with medicines.

(Afternoon)

The committee appointed to consider some method for supplying the surgeons in the army with medicine, reported: the report was read and accepted, and is as follows, viz.:

The committee appointed to take into consideration a complaint that the surgeons in the army are not properly furnished with medicines, have attended that service, and beg leave to report: that whereas, it appears that there is not, as yet, a suffi-

cient number of medicine chests provided, to furnish each regiment with a distinct chest; and whereas, the committee of supplies are making provision for the supplying of each regiment with such medicine chests as soon as possible: therefore, *Resolved*, That the committee of supplies be, and hereby are directed, immediately to furnish the surgeon of the first regiment at Cambridge, and also the surgeon of the first regiment at Roxbury, each of them, with a medicine chest, for the present; and that all the other surgeons in the army at Cambridge and Roxbury, have free recourse to the said chests, and be supplied from them, from time to time, as they shall find occasion, until more ample provision shall be made for them: all which is humbly submitted, and the committee beg leave to sit again.

William Whiting, *per order*.

Ordered, That the same committee be appointed to examine into the medical stores, and make a list of what is necessary for the supplying each regiment, that the same may be laid before the committee; and that the same committee consider what medicines are necessary, and bring in a list of what medicines are in the medical store: and that they be directed to report what instruments are necessary for the surgeons of the army.

June 16, 1775. 341

Doct. Hall and Doct. Jones were added to the committee to examine surgeons for the army. *Resolved*, That any three of said committee shall be a quorum.

June 19, 1775. 355, 357, 360-1

Doct. Hall, Doct. Jones and Mr. Bigelow, were appointed a committee to consider the expediency of establishing another hospital for the sick and wounded of the army, and ordered to sit forthwith.

The committee appointed to consider the expediency of establishing another hospital for the army, reported, that a house belonging to Doct. Spring, of this place, may be had for that purpose, whereupon,

Resolved, That said committee be directed to inquire at what rate, per month, Doct. Spring will let the same.

Doct. Gunn was appointed to report a resolve on the proposal made by the committee of safety, relative to the killed and wounded in the late battle.

Upon a motion made, *Resolved*, that the house of Mr. Hunt, at Cambridge, be hired for a hospital, and that the committee appointed to treat with Doct. Spring, be a committee to hire the same.

Ordered, That Doct. Church, Doct. Taylor, and Doct. Whiting, be a committee to consider what method is proper to be taken to supply the hospitals with surgeons: and that the same gentlemen be a committee to provide medicines, and all other necessities for the hospitals.

The committee appointed to confer with Doct. Spring, relative to the use of his house for another hospital, reported: the report was read and accepted, and is as follows, viz.:

The committee appointed to consider of the expediency of establishing another hospital for the sick and wounded of the army, having attended that ser-

vice, beg leave to report, that they judge it is really expedient to have another established, and they judge that the house of Doct. Spring, in Watertown, is convenient for that purpose; and that he is willing said house should be improved by the province for that use, but that he cannot at present ascertain the damage it may be to him, but is willing to submit that matter to the judgment of a committee to be hereafter appointed by this honorable Congress or the house of assembly.

June 22, 1775. 374, 375, 377

Ordered, That Doct. Francis Kittridge be desired to attend the hospital, as a surgeon, till the further order of Congress, and that Mr. Kendall be desired to inform Doct. Kittridge of his appointment.

Ordered, That the colonels of the several regiments in the Massachusetts army, be directed to recommend, immediately, suitable persons for surgeons and surgeons' mates.

Ordered, That a hospital be provided for the camp at Roxbury, and that Col. Davis, Doct. Taylor and Doct. Whiting, be a committee to provide one accordingly, and to supply the same.

Resolved, That (the colonels¹) in the Massachusetts army, be and they are hereby directed, immediately to inform the committee appointed by Congress to examine the surgeons for said army, whom they recommend for the surgeons and surgeon's mates of their respective regiments, and send them to said committee for examination, without delay; except such as have been examined.

June 23, 1775. 378

The committee appointed to provide a hospital for the camp in Roxbury, reported as follows: That they have appointed the house belonging to Joshua Loring, in said Roxbury, for a hospital, and for the use of said camp. The report was accepted.

June 24, 1775. 383, 384, 387

Voted, That there shall be two surgeons and two mates appointed for each hospital, and commissioned accordingly.

Ordered, That the committee appointed to examine the surgeons, be desired to report an establishment for surgeons of hospitals.

The committee appointed to consider an establishment for the surgeons of hospitals, reported: the report was accepted, and is as follows, viz.: that it is their opinion, that the establishment of the chief surgeons should be at the rate of eight pounds per month, and each mate, four pounds, ten shillings, per month.

The committee appointed to hire a house of John Hunt, Esq., for a hospital, reported the following proposal, which was accepted, viz.:

Gentlemen:—With respect to the hire of the house belonging to John Hunt, Esq., for a hospital, the proprietor only expects such a consideration from the colony, as will be a satisfaction for the necessary damage to the house, expecting proper care will be taken that the out-houses, &c., be kept in good order.

W. Hunt, in behalf of the proprietor.

¹ (each colonel).

June 27, 1775. 406

Ordered, That the committee appointed to provide hospitals for the army, be directed to provide another hospital, to be appropriated solely for such of the army as may be taken with the small pox, and to consider what measures can be taken to prevent the spreading of that distemper, and that Doct. Rand, and Doct. Foster, be added to the committee.

June 28, 1775. 415

The form of a warrant for the surgeons was read and accepted, and is as follows, viz.:

The Congress of the Massachusetts Bay, to A. B. Greeting.

Being informed of your skill in surgery, and reposing especial trust and confidence in your ability and good conduct, we do, by these presents, constitute and appoint you the said A. B., to be surgeon of the regiment of foot, whereof: ——— is colonel, raised by the Congress aforesaid, for the defence of said colony. You are, therefore, carefully and diligently to discharge the duty of a surgeon to the said regiment, in all things appertaining thereunto, observing such orders and instructions as you shall, from time to time, receive from the colonel of said regiment, according to military rules and discipline established by said Congress, or any your superior officers, for which this shall be your sufficient warrant.

By order of the Congress,
————— President.

Dated at Watertown.

June 30, 1775. 423, 4

The committee appointed to consider some measures to prevent the spreading of the small pox, were directed to sit forthwith.

The form of a warrant for surgeons of the hospital, was read and accepted, and is as follows, viz.:

The Congress of the Colony of the Massachusetts Bay, to ——— Greeting.

Being informed of your skill in surgery, and reposing special trust and confidence in your ability and good conduct, (we) do by these presents, constitute and appoint you, the said ——— to be a surgeon of the hospital, established by order of the Congress, in ———, for the sick and wounded of the colony army. You are, therefore, carefully and diligently to discharge the duty of a surgeon of said hospital, in all things appertaining thereto, observing such orders and instructions as you shall, from time to time, receive from any, your superior officers, according to the rules and discipline established by said Congress, for which, this shall be your sufficient warrant.

By order of Congress,
Dated the ——— day of ——— A. D. 1775.

Ordered, That warrants be made out to the following officers, viz.: Doct. Lemuel Cushing, surgeon; Doct. Gad Hitchcock, surgeon's mate; . . . Doct. Lemuel Howard, surgeon to the Roxbury Hospital.

July 1, 1775. 436, 7

Ordered, That Doct. Taylor, Mr. Fox, and Capt. Bragdon, be a committee to bring in a resolve, di-

recting how the sick and wounded shall be removed to the hospitals.

The committee appointed to devise means for the better accommodation of the sick and wounded of the colony army, reported. The report was accepted, and is as follows, viz.: In order that all the sick and wounded in the army may be provided for, and taken care of, in the best way and manner possible, *Resolved*, and it is hereby *Ordered*, that when any person in the army is so ill, either by a wound or otherwise, that the surgeon of the regiment, to which the sick or wounded person belongs, finds the sick or wounded as abovesaid cannot be properly taken care of in the regiment to which he belongs, said surgeon shall send the sick or wounded as abovesaid, to the hospital provided for the use of the camps to which they belong, and a certificate of the man's name, and the company and regiment to which he belongs; and in that case, the surgeon of the said hospital shall receive said sick or wounded under his care; and in case said hospital shall become too full, in that case, the surgeon of said hospital shall send such of his patients as may with safety be removed, to the hospital in Watertown and a certificate setting forth the man's name, what company and regiment each belongs to; and in that case the surgeons of the Watertown hospital shall receive said sick or wounded under his care.

July 4, 1775. 445, 446, 448

Ordered, That Mr. Pickering, Mr. Partridge, and Mr. Goodwin, be a committee to prepare a letter to General Washington, informing him of the provision this Congress has made for the sick and wounded of the army.

Ordered, That Doct. Taylor, Doct. Church, and Mr. Johnson, be a committee to bring in a resolve appointing Doct. (Andrew) Craigie, a commissary of medical stores, and that said committee be directed to consider what is a proper establishment for his pay.

The committee appointed to bring in a resolve for appointing Mr. Craigie, medical commissary, reported. (The report) was read, and is as follows, viz.:

Resolved, That Mr. Andrew Craigie be, and he is hereby appointed a medical commissary and apothecary for the Massachusetts army, and that said Craigie be allowed five pounds per month, for his services as abovesaid.

Ordered, That the committee for making out commissions make out a warrant for Mr. Craigie, medical commissary.

July 5, 1775. 449, 450, 455.

A list of surgeons who have been examined and approved of, by a committee of this Congress, was laid before the Congress, and read, and is as follows:

Doct. David Jones, surgeon; Samuel Blanchard, mate, in Col. Gerrish's regiment; Aaron Putnam, mate, in Col. Fry's regiment; Joseph Hunt, mate to Doct. Joseph Foster, in Cambridge hospital; Jacob Bacon, mate in Col. Scammon's regiment; Harris Clary Frides, mate; Edward Durant, surgeon, Col. Mansfield's regiment; Josiah Harvey, mate, Col. Fellow's regiment; Abraham Watson, Jr. surgeon,

William Vinal, mate, Col. Gardner's regiment; Doct. John Georges, mate, General Heath's regiment; Doct. Isaac Spafford, surgeon, Col. Nixon's (regiment);* Doct. John Crooker, surgeon in Col. Scammon's regiment; Doct. Walter Hastings, surgeon in Col. Bridges' (regiment); Doct. Timothy Child, surgeon, in Col. Patterson's (regiment); Doct. Levi Willard, surgeon, in Col. Reed's (regiment); Doct. Daniel Parker, surgeon, in Col. Walker's (regiment); and Doct. Thomas Kittridge, surgeon, in Col. Fry's regiment.

Thereupon, *Ordered*, That warrants be made out for them agreeably thereto.

Resolved, That the order of Congress relative to the date of the warrants for the staff officers, be so far reconsidered, as that the warrants for the surgeons be dated the 28th June, ultimo.

A form of a warrant for a medical commissary, was read and accepted, and is as follows, viz.:

The Congress of the Colony of the Massachusetts Bay, to ——— Greeting.

We, being informed of your skill in medicine, and reposing especial trust and confidence in your ability and good conduct, do, by these presents, constitute and appoint you the said ———, to be medical commissary and apothecary to the army raised by the Congress, for the defence of this colony. You are, therefore, carefully and diligently to discharge the duty of a medical commissary and apothecary in all things appertaining thereto, observing such orders and instructions as you shall, from time to time, receive from any your superior officers, according to the rules and discipline established by said Congress, for which this shall be your sufficient warrant.

By order of Congress,
———, President.

The committee appointed to prepare a letter to General Washington, enclosing a resolution of Congress relative to the sick and wounded, reported. The report was accepted, and is as follows, viz.:

(*To his Excellency General Washington*.)

This Congress ordered the enclosed resolution to be prepared, and sent to Generals Ward and Thomas; but by the agreeable event of your excellency's appointment to the chief command of the American army, and arrival at camp, the propriety of that step ceases. We mean not to dictate to your excellency, but presume, that to secure the health of the army, and (to afford) relief for the sick, will naturally engage your attention. Every thing in the power of this Congress (to do) to enable you to discharge, with ease, the duties of your exalted and important station, will be, by us, attended to, with the greatest alacrity. If the enclosed resolution has that tendency, we attain the end intended by transmitting to you the same, and are, with respect,

Your Excellency's most humble servants.

July 7, 1775. 464

Ordered, That a warrant be made out for Doct. Isaac Foster, as surgeon of the hospital at Cam-

bridge, and another to Doct. Isaac Rand, as surgeon of the hospital at Roxbury.

July 8, 1775. 470, 472, 476

A list of surgeons examined by a committee appointed for that purpose, was exhibited to Congress, and warrants ordered to be made out agreeably thereto.

Resolved, That three o'clock, in the afternoon, be assigned, to consider the expediency of appointing a surgeon general for the Massachusetts forces.

Resolved, That eight o'clock to-morrow morning be assigned for the consideration of the expediency of appointing a surgeon general of the Massachusetts army.

July 11, 1775. 488, 489

Ordered, That Mr. Crane, and Mr. Fox, make out warrants for several surgeons and surgeons' mates, agreeably to a list this day exhibited by Doct. Taylor, and that such warrants, when made out, be transmitted to the committee of safety.

Resolved, That Doct. Church, Doct. Taylor, and Doct. Whiting, be a committee to take into their custody all the medicines, medical stores and instruments, which are, or may be provided for the use of the army, by this colony, and to distribute them at their best discretion, so that no peculation or needless waste be made of the medicinal stores belonging to the public.

December 20, 1774. 506

Voted, unanimously, that Doct. Warren, Doct. Church, and the Hon. John Hancock, Esq., be a committee to inspect the commissaries' stores, in Boston, and report what surgeon's stores and stores of other kind are there.

February 21, 1775. 509

Voted, That Docts. Warren and Church be a committee to bring in an inventory of what is necessary in the way of their profession, for the above army to take the field.

February 24, 1775. 512

Voted, That Doct. Warren, Doct. Church, Mr. Gerry, Mr. Cheever, Col. Orne and Mr. Devens, make inquiry where fifteen doctor's chests can be got, and on what terms, and report at the next meeting.

March 7, 1775. 512

Voted, That the committee of supplies be directed to make a draft on Henry Gardner, Esq., the receiver general, in favor of Doct. Joseph Warren and Doct. Benjamin Church, for five hundred pounds, lawful money, to enable them to purchase such articles for the provincial chests of medicine as cannot be got on credit, to be deducted from the provincial tax payable by the town of Boston.

April 18, 1775. 517

Voted, That two medicinal chests still remain at Concord, at two different parts of the town; three of said chests at Sudbury, in different parts of the town; six do. at Groton, Mendon, and Stow, two in each town, and in different places; two ditto in

* Material in parentheses was placed in brackets in the original mss.

Worcester, one in each part of the town; and, two in Lancaster, ditto; that sixteen hundred yards of Russia linen be deposited in seven parts, with the doctor's chests; that the eleven hundred tents be deposited in equal parts in Worcester, Lancaster, Groton, Stow, Mendon, Leicester, and Sudbury.

April 21, 1775. 521

Voted, That Major Bigelow be applied to, to furnish a man and horse to attend the surgeons, and convey medicines agreeably to their directions.

April 29, 1775. 527

Voted, That Doct. Isaac Foster be directed and empowered to remove all the sick and wounded, whose circumstances will admit of it, into the hospital, and to supply proper beds and bedding, clothing, victuals, and furniture, with every other article he shall judge proper for said hospital, and that this be a sufficient order for him to draw on the commissary for such articles as he can supply, and to draw orders upon the commissary for the payment of whatever expenses are necessary for procuring the above mentioned articles.

April 30, 1775. 530

Voted, That Andrew Craigie be appointed to take care of the medical stores, and to deliver them out as ordered by this committee; and that the secretary make out his commission accordingly.

May 7, 1775. 538

Whereas, it appears to this committee, that great uneasiness may arise in the army, by the appointment of surgeons who may not be agreeable to the officers and soldiers in their respective regiments, therefore, *Voted*, that it be recommended to the Congress, to allow the colonel of each regiment to nominate the surgeon for his regiment; said surgeon to nominate his mate; and unless there is some material objection made against them, that they be accordingly appointed.

May 13, 1775. 544

Voted, That General Thomas be desired to deliver out medicines to such persons as he shall think proper, for the use of the sick soldiers at Roxbury, until the surgeons for the respective regiments are regularly appointed.

Voted, That the provisions and chest of medicines belonging to Madam Vassal, now under the care of Col. Starks, be stored as Col. Starks may direct, till further orders: and that the other packages may pass into Boston or elsewhere.

May 14, 1775. 545

Mr. Andrew Craigie, commissary of the medicinal stores, &c., was directed and empowered to impress beds, bedding, and other necessaries for the sick, as they may be wanting, giving the owners a receipt for such articles as he may take for the purpose aforesaid.

June 13, 1775. 566

The committee earnestly recommend to the honorable Congress that the representations from the quarter master general, be taken into immediate

consideration, especially as the committee, from their own knowledge, find the rooms too much crowded, and the healths and lives of the soldiers thereby greatly exposed; and if tents cannot be immediately furnished, that some barracks be forthwith erected.²

June 14, 1775. 566

Whereas, this committee are informed, that Doct. How, of Andover, is prepared to receive (insane patients,) and is well skilled in such disorders as Daniel Adams, of Boston, sent on the 13th instant, to the town of Woburn, is affected with, therefore, *Resolved*, that the selectmen of the town of Woburn, be, and they hereby are released from keeping said Daniel Adams in the town of Woburn, and they are required to provide a horse and carriage, with provisions, to forward the said Adams to Andover, the expense of which will be paid by this colony.

Resolved, That Daniel Adams, a lunatic, now at Woburn, be carried to the town of Andover, and committed to the care of Doct. How, and the said Doct. How is hereby desired to take proper care of the said lunatic, at the expense of this colony.

June 19, 1775. 571

Resolved, That the house of the Rev. Samuel Cook, of Menotomy, be improved as a hospital for the colony army; and that Mr. William Eustis be, and hereby is appointed, to the care of the sick and wounded in said hospital, till the further order of this committee.

Ordered, That Doct. Isaac Foster be, and he hereby is directed, to take up and improve as hospitals, so many houses in Menotomy, as he may find necessary for the safety of the sick and wounded of the colony army, and that he employ such person or persons as may be necessary to carry such provisions and other necessaries as may be wanted for the use of the aforesaid sick and wounded; and further, that he take such precautions, respecting the small pox hospital, as may be necessary for the prevention of the spreading of that epidemical disorder in the camp or elsewhere.

June 26, 1775. 578

Whereas, this committee find the public hospital in this town has been much neglected, to the great injury of the patients in said hospital, occasioned by the want of some suitable person being placed there as surgeon, therefore, *Resolved*, that Doct. John Warren, be, and he hereby is appointed, to the oversight of said hospital, and that he take proper care such provision be made as may be necessary for the comfortable support of the patients in said hospital until further orders.

July 15, 1775. 597

Complaint having been made to this committee by the honorable General Ward, and other officers in the army, that several men are dangerously sick, and their lives would be greatly hazarded, except

² The quartermaster general represented, that there was great want of tents and barracks, and that the least delay in making provision for the shelter of the troops, would be attended with injurious consequences.

immediate application of medicine be made to them, and that the surgeons of some of the regiments had applied, but could not obtain any; a sub-committee was therefore chosen to visit the hospital, and to see the surgeons, and, upon inquiry, found that there were no such medicines as are immediately wanted: therefore, *Resolved*, that as the lives of some part of the army are in great danger, for want of medicines, notwithstanding the commission of the committee of safety does not admit of direction in this matter, that Mr. Commissary Craigie be desired to procure, at the expense of the colony, such medicines as may be immediately and absolutely necessary; in consequence of which, the following order was given Mr. Commissary Craigie:

Sir:—You are hereby desired immediately to supply the store under your care, with such medicines as are absolutely necessary for the present relief of the sick in the army.³

Report of the Committee sent to Ticonderoga,
Cambridge, July 6, 1775.

Your committee, being of opinion, that a major should be appointed under Col. Easton, and one surgeon to the battalion, and having inquired into the disposition of the officers and men who have engaged, have appointed John Brown, Esq., as major, and Mr. Jonas Fay, as surgeon.

..... All which is humbly submitted,
WALTER SPOONER, *by order*.

II. FROM JOURNALS OF THE CONTINENTAL CONGRESS (1774-83)

June 2, 1775. 76

The President laid before the Congress a letter from the Provincial Convention of Massachusetts which was read and was as follows:

In prov. Congress, Watertown, May 16, 1775.

Resolved, That Doct^r. Benjamin Church be ordered to go immediately to Philad^a. and deliver to the president of the Hon^{ble}. American Congress there now sitting, the following application to be by him communicated to the members thereof: and the s^d Church is also directed to confer with the s^d Congress, respecting such other matters as may be necessary to the defence of this colony and particularly the state of the army therein. . . .

July 19, 1775. 191

Resolved, That a Committee of three be appointed to report the method of establishing an hospital.

The committee chosen, Mr. (Francis) Lewis, Mr. (Robert Treat) Paine, and Mr. (Henry) Middleton.

July 24, 1775. 203

The Committee for that purpose appointed^t bro^t in a report for establishing a hospital. Ordered to lie on the table.

July 25, 1775. 203.

Report read:

³ Although the sessions of the committee continued after the fifteenth day of July, 1775, the journal is not preserved to a later date.

July 27, 1775. 209-211

The Congress took into consideration the report of the committee on establishing an hospital, and the same being debated, was agreed to as follows:

That for the establishment of an hospital for an army, consisting of 20,000 men, the following officers and other attendants be appointed, with the following allowance or pay, viz.:

One Director general and chief physician, his pay per day, 4 dollars.⁴

Four surgeons, per diem each, one and one third of a dollar.

One apothecary, one and one third of a dollar.

Twenty (surgeons') mates, each, two thirds of a dollar.

One clerk, two thirds of a dollar.

Two storekeepers, each four dollars per month.

One nurse to every 10 sick, one fifteenth of a dollar per day, or 2 dollars per month.

Labourers occasionally.

The duty of the above officers: viz.:

Director to furnish medicines, Bedding and all other necessities, to pay for the same, superintend the whole, and make his report to, and receive orders from the commander in chief.

Surgeons, apothecary and mates. To visit and attend the sick, and the mates to obey apothecary and the orders of the physicians, surgeons and apothecary.

Matron: To superintend the nurses, bedding, &c.

Nurses: To attend the sick, and obey the matron's orders.

Clerk: To keep accounts for the director and store keepers.

Storekeeper: To receive and deliver the bedding and other necessities by order of the director. . . .

The Congress then proceeded to the choice of officers for the Hospital, when,

Benjamin Church was unanimously elected as director of, and chief physician in, the hospital.

Resolved, That the appointment of the four surgeons and the Apothecary be left to Doct^r. Church.

That the Mates be appointed by the Surgeons;

That the number do not exceed twenty; and

That the number be not kept in constant pay, unless the sick and wounded should be so numerous as to require the attendance of twenty, and to be diminished as circumstances will admit; for w^{ch} purpose, the pay is fixed by the day, that they may only receive pay for actual service.

That one Clerk, two storekeepers, and one nurse to every 10 sick, be appointed by the Director.

September 14, 1775. 249

5th, sundry letters from General Schuyler,⁵

The same being taken into consideration,

On motion made, *Resolved*, That Samuel Stringer, Esq^r be appointed director of the Hospital, and chief Physician and surgeon for the Army in the Northern department.

That the pay of the s^d Samuel Stringer, as Director, Physician, and Surgeon, be four Dollars per day.

⁴ The original plan provided for a Director General and a Physician, each to receive four dollars a day.

⁵ Letters dated July 26, 27, 28, and August 6, read in Congress on this day, are in *Papers of the Continental Congress*, No. 153, folios 63, 71, 77, 102.

That he be authorized and have power to appoint a number of surgeon mates under him, not exceeding four.

That the pay of said mates be $\frac{2}{3}$ of a dollar per day.

**[That the number be not kept in constant pay, unless the sick and wounded be so numerous as to require the constant attendance of four, and to be diminished as circumstances will admit, for which reason the pay is fixed by the day, that they may only receive pay for actual service.]*

That the deputy Commissary general be directed to pay Doctr. Stringer for the Medicines he has purchased for the use of the army, and that he purchase and forward such other medicines as General P. Schuyler shall, by his warrant, direct, for the use of said army.

That M^r (Eliphalet) Dyer, M^r (Thomas) Lynch, M^r (John) Jay, M^r (John) Adams, and M^r (Francis) Lewis, be a Committee to devise ways and means for supplying the continental army with Medicines.

September 23, 1775. 261

On motion *Ordered*, That the Committee appointed to devise ways and means of supplying the Army with Medicines, do buy a parcel of Drugs in the hands of Mr. Rapalje, which he offers at the prime cost.

October 14, 1775. 294-295

On motion made,

Resolved, That a director general and chief physician of the Hospital in Massachusetts bay, be appointed in the room of Doct^r (Benjamin) Church, who is taken into custody for holding a correspondence with the enemy.

Resolved, That the Congress will, on Monday next, proceed to the election of a director general and chief physician of the Hospital, in the room of Doct^r Church.

October 17, 1775. 297

The Congress proceeded to the election of director general and chief physician of the Hospital, in the room of Doct^r (Benjamin) Church, and the ballots being taken and exam'd,

Doct^r (John) Morgan, (of Philadelphia,) was elected.

November 7, 1775. 334

Resolved, That Dr. Church be close confined in some secure gaol in the colony of Connecticut, without the use of pen, ink, and paper, and that no person be allowed to converse with him, except in the presence and hearing of a Magistrate of the town, or the sheriff of the county where he shall be confined, and in the English language, until farther orders from this or a future Congress.

November 10, 1775. 344

Resolved, That the medicines purchased in this city for the army at Cambridge, be sent thither by land.

** Material placed in brackets is crossed out in original mss.*

December 8, 1775. 416

On motion, *Resolved*, That a surgeon be allowed to each regiment, (in the service of the United Colonies;)

That the pay of a regimental Surgeon be 25 Dollars per (calendar) month.

William Barnet, jun. was unanimously elected surgeon of the first or eastern battalion raised in New Jersey.

December 21, 1775. 442

Doctor James Holmes was chosen surgeon to Colonel Maxwell's regiment.

January 8, 1776. 38

Resolved, That the provisions heretofore made for an hospital in the northern army, when it was more numerous than it is now, is sufficient.

January 17, 1776. 61

A Petition from Benjamin Church was presented to Congress, and read:⁶

Ordered, That the same be referred to a committee of three.

January 18, 1776. 65

The committee on the petition of Dr. Church, brought in their report, which being taken into consideration,

Resolved, That Governor Trumbull be desired to give order for the removal of Dr. Church to some more comfortable place of confinement than that where he now is, if such can be found in that colony; and that, for the advancement of his health, the said Dr. Church be permitted to ride out, at proper seasons, under a trusty guard, who will be careful to prevent his carrying on any correspondence, or doing any act prejudicial to the safety and welfare of the United Colonies.

A letter from the committee of Frederic town, (Maryland,) enclosing sundry intercepted letters of Connolly, taken on Dr. John Smith, (one of Connolly's associates,) and brought by the guard who had the charge of bringing down said Smith, was laid before Congress and read:

Resolved, That it be recommended to the committee of safety of Pennsylvania, to take the examination of Dr. Smith, and then commit him to safe and close confinement.

January 25, 1776. 87-8

A letter from Richard Huddleston,⁷

The same Committee on considering Dr. Huddleston's Letter, are of Opinion,

That he be immediately set at Liberty on the Terms he mentions. And that a verbal Proposition be sent by him to General Carleton, to enter into a Stipulation on both sides, not only to release all Physicians and Surgeons; but that if by the Fortune of War, the Hospital of either Army should fall into the Power of the other, the same Subsistence and Supplies should be afforded to the Sick

⁶This petition is in the *Papers of the Continental Congress*, No. 41, II, folio 5.

⁷The letter of Huddleston is in the *Papers of the Continental Congress*, No. 78, XI, folio 13.

and Wounded as if Friends; and that neither they nor the Attendants of the Hospitals should be considered or detain'd as Prisoners. And it is farther the Opinion of the Committee, that if Govr. Carleton should not agree to the mutual Release of Surgeons, Dr. Huddleston is to be on his Parole, to return immediately hither.⁸

January 30, 1776. 101

Resolved, That Dr. Cadwalader and Dr. W. Shippen, Jun^r be desired to inspect the room of the gaol where General Prescott is confined, and enquire into the state of his health, and report to Congress.

January 31, 1776. 105

Dr. Cadwalader and Dr. Shippen returned their report respecting the room where General Prescott is confined, and the state of the general's health, which was read.

March 1, 1776. 180

Resolved, That the Secret Committee be empowered to treat with the owners of some medicines lately imported, and purchase the same on the most reasonable terms for the use of the continent.

March 7, 1776. 188

Resolved, That the Committee appointed to provide medicine chests be directed to supply the first and third New Jersey battallions with proper medicine chests and instruments.

March 11, 1776. 197

Resolved, That the committee on applications and qualifications &c. be directed to provide 6 medicine chests for the 6 Virginia battallions.

March 22, 1776. 225

A petition from Thorowgood Smith, and others, was presented to Congress, and read, setting forth, that they have procured a vessel, and raised money to fit her out as a privateer, in order to guard and cruise on the coast of Virginia, and praying that a commission be granted to William Shippen, to whom they propose to give the command of said vessel; and that the Congress will grant them a small quantity of powder, upon their making satisfaction for the same:

Resolved, That a commission be granted to William Shippen, as captain of the above mentioned vessel, for the purposes aforesaid.

Resolved, That Captain William Shippen be supplied with three hundred weight of powder by the Secret Committee, he paying for the same.

⁸ This report, in the writing of Benjamin Franklin, is in the *Papers of the Continental Congress*, No. 19, III, folio 215. The following notes in the writing of Franklin are in No. 78, XIX, folio 7.

⁹ Agreed to set Dr. Huddleston at Liberty on the Terms he mentions. And send by him a Proposition to Gen. Carleton, that it be Stipulated on both Sides, not only to release all Surgeons; but that if by the Fortune of War, the Hospital of either Army should fall into the Power of the other, the same Care should be taken of the Sick and Wounded as of Friends, and that neither they nor the Attendants of the Hospital should be considered as Prisoners. And if Gov^r Carleton should not agree to the mutual release of Surgeons, Dr. Huddleston is to be on his Parole to return immediately. . .

March 23, 1776. 229

The Committee of Claims reported that there is due,

To Dr. Jonathan Potts, for attendance on the second and fourth Pennsylvania battallions, the sum of 125.6.9=67.6 dollars.

March 30, 1776. 242-3

Resolved, That each regimental surgeon be allowed a mate:

Resolved, That the pay of a surgeon's mate be 18 dollars per month.

Resolved, That (suitable chirurgical) instruments be purchased with each medicine chest.

April 11, 1776. 271

To Dr. Jonathan Potts, for attending the prisoners at Reading, the sum of £28.15.0 (=76.6 dollars); and for sundry medicines, &c. provided for the middle department, the sum of £50.9.1 (=134.6 dollars,) amounting, together, to the sum of £79.4.1=211.2 dollars.

April 29, 1776. 317

A letter from Thomas Bullit and a petition from Dr. J. Potts, was presented to Congress and read.⁹

Resolved, That they be referred to the foregoing committee.

May 6, 1776. 330

Resolved, that the convention, or committee or council of safety of Virginia, be empowered to appoint surgeons to the battallions raised in said colony, for the service of the continent.

May 10, 1776. 344

G. 6. That Dr. Potts be taken into the Pay of the Continent and be employed in the Canada Department or at Lake George as the Genl Schuyler shall think fit. But that this Recommendation be not considered so as to supersede Dr. Stringer. That the Pay of Dr. Potts be Dollars per Mo.

May 11, 1776. 348

Resolved, That two sets of trepanning instruments be sent to Virginia for the use of the surgeons of the continental troops there; and that two sets of trepanning instruments, and 100 lb. of Peruvian bark, be sent to North Carolina, for the use of the continental troops in that colony.

May 13, 1776. 350

Sundry petitions were presented to Congress and read, viz.: One from Benjamin Church, accompanied with one from Benjamin Church, Samuel Church and Edward Church, and a certificate from three Doctors (respecting the health of Dr. B. Church;) one from John Connolly and John Smith, accompanied with a letter from Dr. (Thomas) Cadwalader.¹⁰

⁹ . . . The petition of Dr. Potts is in the *Papers of the Continental Congress*, No. 78, XVIII, folio 56. . . .

¹⁰ The petition of Connolly is in the *Papers of the Continental Congress*, No. 78, V, folio 39. That of Smyth is in No. 78, XX, folio 29. That of Cadwalader is in No. 78, V, folio 43.

May 14, 1776. 352

The committee to whom the petition of Dr. Benjamin Church, now confined in gaol in Norwich, in the colony of Connecticut, and also a petition from Benjamin, Samuel, and Edward Church, together with a certificate from physicians, respecting the dangerous state of the aforesaid Dr. Church, were referred, brought in their report, which was read and agreed to: Whereupon,

Resolved, That Dr. Benjamin Church be sent to the colony of Massachusetts bay, and that the council of the said colony be requested to take a recognisance from him, with two good sureties, in such penalty as they shall think sufficient, not being less than one thousand pounds, lawful money, for his appearance before such court as shall be erected for his trial, and at such time and place as such court shall direct, and to abide the judgment of the same; and that they be farther requested, to take his parole, not to hold any correspondence with the enemies of the United Colonies, or at any time, to depart out of the same colony, without their license; and that, upon the performance thereof, the said Dr. Benjamin Church be set at liberty.

May 16, 1776. 358

A letter from General Washington, of May (15), enclosing a letter (to him) from Dr. Stringer.¹¹

Resolved, That the letter from Dr. Stringer to General Washington, be referred to the committee appointed to prepare medicine chests:

May 18, 1776. 284

That a continental Hospital be established in Virginia, and a director to the same be immediately appointed by Congress.

May 22, 1776. 378

15. That—Surgeons and—mates be added to the Hospital in Canada and that Doct^r Stringer be directed to procure them.¹²

June 5, 1776. 419

That the pay of the regimental surgeons be augmented to thirty three dollars and one third of a dollar a month.

June 6, 1776. 424

Resolved, That doctor Jonathan Potts be employed as a physician and surgeon in the Canada department, or at Lake George, as the general shall direct; but, that this appointment shall not supersede Dr. Stringer.

June 17, 1776. 449, 453

U. 6.¹³

R. 8. That the committee, appointed to provide medicines, be directed to send a proper assortment of medicines to Canada:¹⁴

¹¹ The letter of Washington is in the *Papers of the Continental Congress*, No. 152, I, folio 685. It is printed in *Writings of Washington* (Ford), IV, 80.

¹² Against this paragraph is written: "Referr'd to to-morrow."

¹³ This paragraph, relating to the appointment of Dr. Jonathan Potts, is stricken out of the Jefferson report, having been printed under line 6, p. 424, *ante*.

¹⁴ In the Jefferson report this paragraph read: "*Resolved*, That a proper assortment of medicines be sent to Canada." Against it Harrison has written "Com^{rs}" already appointed to provide medicines."

June 18, 1776. 460-461, 463

A memorial from Dr. (John) Morgan, director general and chief physician of the Hospital, was laid before Congress, and read:¹⁵

Resolved, That it be referred to the committee appointed to provide medicines.

Resolved, That Mr. (Thomas) Heyward (Jr.), and Mr. (Lyman) Hall be added to the committee for providing medicines.

June 19, 1776. 466

To Mary Thomas, for nursing and boarding two of Captain Benezet's men, in the small pox, the sum of £4.10.0=12 dollars:

Ordered, That the said accounts be paid.

Resolved, That the committee for preparing medicine chests, be directed to send a chest of medicines to the surgeon of said battallion.

A memorial from the mates of the Hospital was laid before Congress and read:¹⁶

Resolved, That it be referred to the committee for providing medicines.

June 20, 1776. 469

To Abraham Mills, for nursing and boarding six soldiers in the small pox, the sum of £12.14.8=33 36/90 dollars:

Resolved, That a committee of five be appointed to consider what provision ought to be made for such as are wounded or disabled in the land or sea service, and report a plan for that purpose:

The members chosen, Mr. (Robert Treat) Paine, Mr. (Francis Lightfoot) Lee, Mr. (Lyman) Hall, Mr. (William) Ellery, and Mr. (Francis) Lewis.

July 8, 1776. 528

Resolved, That the committee for providing medicines, be directed to supply the militias aforesaid, with a sufficient quantity of suitable medicines.

July 12, 1776. 556

The committee appointed to take into consideration the memorial of the director general of the American hospital, brought in their report, which was read:

Ordered, To lie on the table.

July 15, 1776. 562

Resolved, That a chief physician be appointed for the flying camp, and that his pay be four dollars per day:

The ballots being taken (and examined),

William Shippen, Jun^r was elected.

July 17, 1776. 568-571

The Congress took into consideration the report of the committee on the memorial of the director general of the American hospital; Whereupon,

[*Resolved*, For the better Government of the general Hospital of the American Army, for explaining and ascertaining more fully the duties of the Director-General, the directors of Hospitals, the Surgeons and Mates, both Hospital and Regimental:]

¹⁵ This memorial is in the *Papers of the Continental Congress*, No. 41, VI, folio 3.

¹⁶ This memorial is in the *Papers of the Continental Congress*, No. 41, III, folio 107.

Resolved, That the number of hospital surgeons and mates be increased, in proportion to the augmentation of the army, not exceeding one surgeon and five mates to every five thousand men, to be reduced when the army is reduced, or when there is no further occasion for so great a number:

That as many persons be employed in the several hospitals, in quality of store keepers, stewards, managers, and nurses, as are necessary for the good of the service, for the time being, to be appointed by the directors of the respective hospitals:

That the several regimental chests of medicines, and chirurgial instruments, which now are or hereafter shall be, in the possession of the regimental surgeons, be subject to the inspection and enquiry of the respective directors of hospitals, and the director general; and that the said regimental surgeons shall, from time to time, when thereto required, render account of the said medicines and instruments to the said directors, or if there be no director in any particular department, to the director general; the said accounts to be transmitted to the director general, and by him to this Congress; and the medicines and instruments not used by any regimental surgeon, to be returned when the regiment is reduced, to the respective directors, and an account thereof by them rendered to the director general, and by him to this Congress:

Resolved, That an Additional Apothecary with such Number of Mates as the Service may require, be allowed, under the Title of Apothecary to the Army, and in subordination to the [General Hospital] Apothecary of the General Hospital.¹⁷

That the several directors of hospitals, in the several departments, and the regimental surgeons, where there is no director, shall transmit to the director general regular returns of the number of surgeons' mates, and other officers employed under them, their names and pay; also, an account of the expences and furniture of the hospital under their direction; and that the director general make report of the same, from time to time, to the commander in chief, and to this Congress:

That the several regimental and hospital surgeons, in the several departments, make weekly returns of their sick to the respective directors in their departments:

That no regimental surgeon be allowed to draw upon the hospital of his department, for any stores except medicines and instruments; and that, when any sick person shall require other stores, they shall be received into the said hospital, and the rations of the said sick persons be stopped, so long as they are in the said hospitals; and that the directors of the several hospitals report to the commissary the names of the sick, when received into, and when discharged from the hospital, and make a like return to the Board of Treasury:

That all extra expences for bandages, old linen, and other articles necessary for the service, incurred by any regimental surgeon, be paid by the director of that department, with the approbation of the commander thereof:

That no more medicines belonging to the conti-

nent be disposed of [by sale till the army is fully supplied] till further order of Congress:

Resolved, that no Surgeon or Surgeon's Mate shall receive a Commo as such in the Army, without having first undergone an Examination by the director, of the hospital of the Department in which he may desire employment or the director Genl and obtained a Certificate from the Commdr and director of that department, or the Director Genl, of his Abilities and knowledge in his business.¹⁸

That the pay of the hospital surgeons be increased to one dollar and two thirds of a dollar by the day; the pay of the hospital mates be increased to one dollar by the day; and the pay of the hospital apothecary to one dollar and two thirds of a dollar by the day; and that the hospital surgeons and mates take rank of regimental surgeons and mates:

Resolved, that the Storekeepers of the several Hospitals be paid by the month, and the Stewards and Managers of the said Hospitals be paid by the Month a sum not exceeding dollars.¹⁹

Resolved, That the duties and privileges of the Surgeons and Mates, not heretofore particularly ascertained, be conformable to the established Usage of other well regulated Armies, as far as is consistent with the Good of the Service, until otherwise settled and directed by this Congress.¹⁸

Resolved, that the Appointments of Surgeons (Surgeons Mates) Storekeepers, Stewards, Managers and Nurses, heretofore mentioned, shall be made by the Director General in the Northern and Eastern Departments; and of the Middle department by the Director, which may hereafter be app'd in that dep't; and in the Southern Dep't by the director of that dep't with the approba. of the Commandr of the respect departments.¹⁹

Resolved, that it be recommend to Congress to purchase the Medicines (now in Phila) belonging to Doctor Morgan.¹⁹

Resolved, that in all levies of Troops hereafter to be raised for the Service of the Continent a stoppage of out of the month's pay of each Man be made for the Use and support of the several Continental Hospitals.¹⁹

That the director general, and the several directors of hospitals, be empowered to purchase, with the approbation of the commander of the respective departments, medicines, and instruments for the use of their respective hospitals, and draw upon the pay master for the same, and make report of such purchases to Congress.²⁰

July 20, 1776. 593

Resolved, That Dr. Senter be recommended to Dr. Morgan; who is desired to examine him; and if, (upon examination,) he finds him qualified, to employ him in the hospital as a surgeon.

July 26, 1776. 612

Resolved, That an order for 2,000 dollars be drawn on the treasurers in favor of Dr. W. Shippen; he to be accountable.

¹⁸ A paragraph that was not retained.

¹⁹ A paragraph that was not retained.

²⁰ This report, in the writing of Thomas Stone, is in the *Papers of the Continental Congress*, No. 19, IV, folio 181.

¹⁷ A paragraph that was not retained.

July 31, 1776. 622

Resolved, That the committee for providing medicines be directed to provide, and send forward, such a quantity of medicines as may be necessary for the Hospital in the northern army:

That the said committee be directed to procure and send forward such a quantity of medicines as may be necessary for the hospital in the southern department.

August 6, 1776. 633

Resolved, That the committee for procuring medicines be directed to supply the director general of the Hospital with such medicines as he may want.

August 7, 1776. 636

Resolved, That Dr. (Benjamin) Rush be added to the committee for procuring medicines.

August 16, 1776. 661

A petition from Dr. Samuel Stringer, was presented to Congress and read:

Resolved, That it be referred to the Medical Committee.

Resolved, That the Medical Committee be empowered to purchase such medicines as they judge proper and useful for the army.

August 20, 1776. 673

The committee to whom was referred the petition of Dr. Stringer brought in their report, which was taken into consideration; whereupon,

Resolved, That Dr. Morgan was appointed director general and physician in chief of the American hospital:

That Dr. Stringer was appointed director and physician of the hospital in the northern department only.

That every director of a hospital possesses the exclusive right of appointing surgeons and hospital officers of all kinds, agreeable to the resolutions of Congress of the 17 of July, in his own department, unless otherwise directed by Congress:

That Dr. Stringer be authorized to appoint a surgeon for the fleet now fitting out upon the lakes:

That a Druggist be appointed in Philadelphia whose business it shall be, to receive and deliver all medicines, instruments, and shop furniture for the benefit of the United States:

That a salary of thirty dollars a month be paid to the said druggist for his labour.

Congress proceeded to the election of a druggist, and, the ballots being taken, Dr. William Smith was elected.

August 26, 1776. 705

Provided, that all such officers and soldiers that may be entitled to the aforesaid pension, and are found to be capable of doing guard or garrison duty, shall be formed in a corps of invalids, and subject to the said duty; and all officers, marines, and seamen of the navy who shall be entitled to the pension aforesaid, and shall be found capable of doing any duty on board the navy, or any department thereof, shall be liable to be so employed:

Ordered, That the above be published.²¹

²¹ Printed in the *Pennsylvania Gazette*, 4 September, 1776.

The Medical Committee, to whom Dr. Mth Henry's petition was referred, brought in their report: Whereupon,

Resolved, That Congress have a proper sense of the merit and services of Dr. Mth Henry, and recommend it to the directors of the different hospitals belonging to the United States, to appoint Dr. Mth Henry to the first vacancy that shall happen, of a surgeon's berth in any of the said hospitals.

August 29, 1776. 717

That the said committee be directed to import the medicines ordered by the Medical Committee.

September 7, 1776. 742

Resolved, That Mr. (Gustavus) Risberg, the assistant to Colonel Biddle, be directed to take proper measures for providing the sick soldiers in Philadelphia, with proper lodgings and attendance.

September 18, 1776. 781

That the Medical Committee send an assortment of proper medicines to the northern army: ²²

September 24, 1776. 812-813

Resolved, That a committee of five be appointed to devise ways and means for effectually providing the northern army with provisions and medicines, and supplying their other necessary wants:

The members chosen, Mr. (Benjamin) Rush, Mr. (Lyman) Hall, Mr. (Samuel) Chase, Mr. (Thomas) Johnson and Mr. (Richard) Stockton.

Resolved, That the Medical Committee be directed to apply to the council of safety of Pennsylvania, for a quantity of medicines; to be repaid in kind or in cash, as they shall chuse.

September 25, 1776. 822, 823, 826

The committee appointed to devise ways and means for providing the northern army with provisions, medicines and other necessities, brought in a report, which was taken into consideration; Whereupon, . . .

That the committee be empowered to make regulations for the hospitals in the northern department, and to remove or suspend any person employed therein, and to employ such as they may think necessary and proper; and that they report to Congress the state and condition of the army, and any further regulations which they may think necessary, for the better government and supplying the said army:

That the committee consist of [three] two, and that to Morrow be assigned for electing the said committee.

To the steward of the Pennsylvania hospital, for boarding William Whiting, a wounded soldier, four weeks, by order of Congress, 5 30/90 dollars:

September 30, 1776. 836-837

That it be recommended to the legislatures of the United States, to appoint gentlemen in their respective states, skilful in physic and surgery, to ex-

²² This report, dated "at a board of war, Sept^r. 14th, 1776" and in the writing of Richard Peters, is in the *Papers of the Continental Congress*, No. 147, I, folio 5. It is endorsed: "partly agreed to. Two paragraphs postpon'd, Sept^r. 18, 1776."

amine those who offer to serve as surgeons or surgeons' mates in the army and navy; and that no surgeon or mate shall hereafter receive a commission or warrant to act as such, in the army or navy, who shall not produce a certificate from some or one of the examiners so to be appointed, to prove that he is qualified to execute the office:

That all regimental surgeons and mates, as well as those of the hospitals, be subject to the direction and controul of the directors in the several departments:

That no soldier be discharged from the service as disabled, unless the certificate of disability be countersigned by the director, assistant physician, or first surgeon of the hospital, nor be excused from duty for sickness, unless the certificate of sickness be countersigned by one of those persons, where access may be had to them.

Resolved, That the remainder of the said report be postponed.

October 7, 1776. 852-3

. . . . Three Camp Kettles for the use of the Hospital, to W. V. Wimple Surgeon; . . .

That said Nicholson delivered five Camp Kettles, to Colo. Hazen, 3 ditto to Doctr. Lynn for the General Hospital, and 3 ditto for the red hospital at St. Foy's.

October 9, 1776. 857-8, 9

Congress resumed the consideration of the report of the committee who went to the camp;²³ Whereupon,

Resolved, That no regimental hospitals be, in future, allowed in the neighbourhood of the general hospital:

That John Morgan, Esq^r provide and superintend a hospital, at a proper distance from the camp, for the army posted on the east side of Hudson's river.

That William Shippen (Jun.), Esq^r provide and superintend an hospital for the army, in the state of New Jersey:

That each of the hospitals be supplied by the respective directors with such a number of surgeons, apothecaries, surgeons' mates, and other assistants, and also with such quantities of medicine, bedding, and other necessaries, as they shall judge expedient:

That they make weekly returns to Congress and the commander in chief, of the officers and assistants of each denomination, and also the number of sick and deceased in their respective hospitals:

That the regimental surgeons be directed to send to the general hospitals such officers and soldiers of their respective regiments, as, confined by wounds or other disorders, shall require nurses or constant attendance, and, from time to time, to apply to the quarter master general, or his deputy, for convenient waggons for this purpose; also, (that they apply to the directors in their respective departments, for medicines and other necessaries:)²⁴

That the wages of nurses be augmented to one dollar per week:

That the commanding officer of each regiment be directed, once a week, to send a commission officer to visit the sick of his respective regiment in the general hospital, and report their state to him:

That for the promoting health in the army, the commissary general be directed to cause the same to be well supplied with Indian meal and vegetables.

October 14, 1776. 869

A letter One from General Washington, of the 7, enclosing a letter from Dr. Morgan, were laid before Congress, and read.

Resolved, . . . That the letter from Dr. Morgan, enclosed in General Washington's letter, be referred to the Medical Committee.

November 4, 1776. 921

It being represented that some of the marines in the barracks are sick,

Resolved, That Doct^r Rush be desired to take them under his care, and see them properly provided for.

November 12, 1776. 940

A letter, . . . and one, of the 9, from Dr. Shippen, were read.²⁵

November 13, 1776. 948

To Doctor Samuel Wilson, for board, attendance, and medicine, to sick soldiers of the 6 Virginia regiment, 33 60/90 dollars:

That there should be paid to Thomas Armer, on account of Elizabeth Robinson, for so much short paid on settlement of her account, the 14th October last, for board, &c. of sick soldiers belonging to Captain Grier's company, 10 dollars:

That there should be paid to the Pennsylvania hospital, for the support and cloathing of John Hughes, a wounded soldier, 36 54/90 dollars:

November 19, 1776. 965

That, on any sick or disabled non-commissioned officer or soldier, being sent to any hospital or sick quarters, the captain or commandant of the troop or company to which he belongs, shall send to the surgeon, or director of the said hospital, or give to the non-commissioned officer or soldier, so in the hospital or quarters, a certificate, (countersigned by the pay master of the regiment, if he be with the regiment,) of what pay is due to such sick non-commissioned officer or private, at the time of his entering the hospital or quarters; and the captain or commandant of the troop or company, shall not receive the pay of the said soldier in hospital or quarters, or include him in any pay abstract during his continuance therein. And, in case any non-commissioned officer or soldier shall be discharged from the hospital or quarters, as unfit for farther service, a certificate shall be given him, by the surgeon or director, of what pay is then due to him; and the said non-commissioned officer or soldier, so discharged, shall be entitled to receive his pay at any pay office, or from any pay master in the service of the United States; the said pay master keeping such original certificate, to prevent impositions, and giving

²³ See note under October 3, p. 844, ante.

²⁴ This sentence is in the writing of John Hancock.

²⁵ The letter of Dr. Shippen is in the *Papers of the Continental Congress*, No. 78, XX, folio 75.

ing the non-commissioned officer or soldier his discharge, or a certified copy thereof, mentioning, at the same time, his having been paid:

November 26, 1776. 983

That the committee, who are sent to the camp, be directed to make particular enquiry into the abuses in the medical department in the army, and report thereon to Congress.

November 28, 1776. 989

The Medical Committee, to whom Dr. Shippen's letter was referred, brought in a report, which was taken into consideration; Whereupon,

Resolved, That Dr. Morgan take care of such sick and wounded of the army of the United States, as are on the east side of Hudson's river, and that Dr. Shippen take care of such of the said sick and wounded as are on the west side of Hudson's river; and that they both be directed to use the utmost diligence in superintending the surgeons and mates of the army, so that the sick and wounded may be effectually provided with everything necessary for their recovery.

November 29, 1776. 990-991

Resolved, That Mr. Mease be directed to supply the sick soldiers, in the House of Employment in Philadelphia, with one shirt apiece.

Resolved, That the Medical Committee be directed to provide sufficient quantities of antiscorbutics for the use of the hospitals in the northern army:

That the hospital at Fort George be continued for the reception of soldiers labouring with contagious diseases, and that there be a general hospital erected on Mount Independence:

That a suitable spot of ground for a garden be enclosed in the neighbourhood of the general hospital, to supply the army with vegetables; and that labourers be hired to cultivate it, under the direction of an overseer, to be appointed by the general or commanding officer:

That the general, or commanding officer, in each of the armies, cause strict enquiries to be made into the³⁰ conduct of the directors of the hospitals, and their surgeons, officers, and servants, and of the regimental surgeons, that if there has been any just grounds of complaint in those departments, the offenders may be punished:

That the colonel or commanding officer of every regiment, make frequent enquiry into the health of the men under his command, and report the state thereof, with any negligence, mal-practice, or other misconduct of the surgeons or others, to the general, and to Congress, delivering copies of such reports to all persons therein accused:

December 1, 1776. 998

Resolved, . . . That the Medical Committee be directed to take such steps, as they shall judge proper, for the accommodation of the sick of the army.

December 5, 1776. 1006

Resolved, That it be and is earnestly recommended to the council of safety of Pennsylvania, to pro-

³⁰ The original report here contained "past as well as future."

cure the Pennsylvania hospital, for the purpose of accommodating the sick belonging to the continental army.

Resolved, That the Medical Committee be empowered to procure suitable persons to take care of the sick, and to remove them to such convenient places in the country, as they shall think proper.

December 12, 1776. 1024

That 5,000 dollars be advanced to Dr. Nicholas Way, (of Wilmington,) for the public service; he to be accountable.

Resolved, That the continental apothecary be directed immediately to pack up all the continental medicines, and send them to the quarter master general:

That the quarter master general be directed to remove all the medicines belonging to the continent in this city to a place of security:

STANDING COMMITTEES

1775-1776

. Medicines p. 1065

14 September, 1775. Eliphalet Dyer

Thomas Lynch

John Jay

John Adams

Francis Lewis

18 June, 1776. Thomas Heyward, Jr.

Lyman Hall

7 August, 1776. Benjamin Rush

January 3, 1777. 13

Resolved, That Dr. (Jonathan) Elmore and Dr. (Nathan) Brownson be added to the Medical Committee.

January 9, 1777. 24-5

Congress resumed the consideration of the report of the Medical Committee; Whereupon,

Resolved, That Dr. John Morgan, director general, and Dr. Samuel Stringer, director of the hospital in the northern department of the army of the United States, be, and they are hereby, dismissed from any farther service in said offices:

That the directors of the military hospitals throughout the army, with the assistance of the hospital and regimental surgeons in each department, make returns to Congress, as soon as possible, of the kind and quantity of medicines, instruments, and hospital furniture that remain on hand.

January 14, 1777. 34

Resolved, . . . That the Medical Committee provide a suitable assortment of medicines, and send them to the hospital in the northern army, with all possible despatch, together with other necessities for the sick; and that the list mentioned by Dr. Stringer, in a paper, No. 1, enclosed in General Schuyler's letter, be committed to them:

That Dr. Potts be directed to repair to Ticonderoga without delay:

That Dr. Stringer be directed to deliver to Dr. Potts, such medicines, and other medical stores, as may be in his hands belonging to the Continent.

January 17, 1777. 44

A letter with a number of papers, from Dr. Morgan, were laid before Congress, and referred to the Medical Committee.

January 18, 1777. 48

To Dr. (John) Witherspoon, for wood supplied the troops at Princetown; for the expences of sick soldiers; and the allowance due to John M'Kinzie, a prisoner from North Carolina, from the 18th October to the 10th January, inclusive, being 12 weeks, 10s 78/90 dollars:²⁷

Ordered, That the said accounts be paid.

January 29, 1777. 70

Resolved, That Dr. Mackenzie, who has the care of the sick in the hospital in Baltimore, be empowered to appoint a mate to assist him.

January 31, 1777. 79-80, 81

Resolved, That a committee of four be appointed to consider what honours are due to the memory of General Warren, (who fell in the battle of Bunker's-Hill, the 17th of June, 1775;) and of the late General H. Mercer, who died on the 12th instant, of the wounds he received on the 3^d of the same month, in fighting against the enemies of American liberty, near Princetown:

The members chosen, Mr. (Benjamin) Rush, Mr. (Thomas) Heyward, Mr. (Mann) Page, and Mr. S(amuel) Adams.

To Dr. Samuel Mackenzie, for sundry medicine purchased by him for the use of the hospital in Baltimore, 86 74/90 dollars:

To Dr. John Hindman, for sundry medicine supplied by him for the use of Colonel Richardson's battallion of Maryland forces, 20 6/90 dollars:

February 4, 1777. 87

A memorial from Dr. Thomas Young was read, and referred to the medical committee.

Resolved, That Dr. (Thomas) Burke be added to the Medical Committee; and that he be appointed a member of the Marine Committee, in the room of Mr. (William) Hooper, who has leave to return home for some time.

February 5, 1777. 91

Ordered, That the Board of War digest the said conference, and bring in a proper report on the several matters mentioned, saving what relates to medicines.

Resolved, That the Medical Committee be empowered to employ a suitable person in each of the states, to purchase such medicines as they shall direct, for the use of the army, which can be procured at any reasonable rates.

|| *Ordered* || That the said committee enquire what is become of the medicines which Dr. Morgan took from Boston, and which Dr. Stringer bought for the northern army, and take measures to have them secured, and applied to the use of the army.

February 12, 1777. 110

Ordered, That the Medical Committee write to General Washington, and consult him on the pro-

²⁷ This report is in the *Papers of the Continental Congress*, No. 132, I, folio 17.

priety and expediency of causing such of the troops in his army, as have not had the small pox, to be inoculated, and recommend that measure to him, if it can be done consistent with the public safety, and good of the service.

February 20, 1777. 139

To Dr. Frederick Phile, for the amount of his account for medicine and attendance to the German battallion, in Philadelphia, (£74 16 6=) 199 48/90 dollars: . . .

Ordered, That the said accounts be paid.

At a Board of War, 20th Feb^r., 1777.

Agreed to report to Congress: . . .

That the Assembly of the State of Maryland be requested to deliver to Doctor McKensie so much Medicines of the following Denominations as he shall want and they can spare, to enable him to inoculate the Continental Troops in this Town, in the following Proportions for one hundred Men.

Six ounces Calomel
Two Pounds Jallop
Three Pounds Nitre

Elix^r Vitriol

One Pound Peruvian Bark

One Pound Virginia Snake Root.²⁸

February 22, 1777. 143

Resolved, . . . That 1,500 dollars be paid to Dr. Samuel M'Kinzie, for the use of the hospital in Baltimore; he to be accountable.

February 25, 1777. 155, 156

Two officers of the 2d and 7th Virginia battallions, who were left to bring up the baggage of their respective battallions, and a surgeon's mate belonging to the 2d battallion, of the Virginia forces, being arrived in Baltimore, applied for two months' pay (for themselves and the men with them), to enable them to proceed with their companies.

Resolved, That they be referred to M^r Jonathan Hudson, who is directed to pay the said officers and [their] men [one] two months' pay; [and to the surgeon two months' pay]; and return an account to the General, and to the pay master general.

Doctor (John) Witherspoon, having represented to Congress that the situation of his private affairs requires his returning home for a short time, desires leave of absence.

Resolved, That leave be granted.

To Dr. Benjamin Rush, for sundry medicine and attendance to sick soldiers and prisoners, the sum of (£177.9=) 473 18/90 dollars:

To Richard Stockton, Esq. and to be paid to Dr. Benjamin Rush, for the hire of two horses, a sulky, &c. for his journey to Ticonderoga last fall, by order of Congress, 151 30/90 dollars:

February 27, 1777. 161-4

The Medical Committee, to whom the report on the hospital was re-committed, brought in a report, which was read:

The Medical Committee having taken into their

²⁸ This report is in the *Papers of the Continental Congress*, No. 147, I, folio 85.

consideration a plan²⁹ for establishing Military Hospitals, [transmitted to Congress by General Washington], agree to report—

Section 1. That the Continent be divided into three districts. The Middle to extend from Hudsons river to Potomac. The Southern to extend from Potomac to Georgia, and the Northern from Hudsons river to Quebec or Crown Point.

2. That there be a Surgeon and Physician Gen^l.²⁹, with a suitable number of Senior physicians, Senior Surgeons and mates to each district. That the sick be taken care of by the physicians, and the wounded by the Surgeons in different apartments.

3. That there be a physician and Surgeon General with the main army whose business it shall be to attend the general and principal Officers of the Army, to enquire into the quality of the food of the Soldiers, to superintend the regimental Surgeons and Mates, and to attend when called upon in consultation with them in all extraordinary cases.

4. That there be an Apothecary General whose business it shall be to purchase such medicines and instruments as shall be judged necessary by the Surgeons and physicians general of the Army. That he have the liberty of appointing three assistant Apothecaries in different parts of the United States, in order to supply with the more convenience the several hospitals, and regimental and Naval Surgeons with medicines and instruments.

5. That there be an Inspector General of the Army of the United States whose business it shall be to visit the Military hospitals and Apothecaries Shops in every part of the Continent; to examine the medicines and instruments belonging to the States; to enquire into the conduct of the several Officers in the medical department and report to the Congress, and Commander in chief at least once a month.

6. That the Surgeons and Physicians General of the hospitals have the liberty of appointing hospital Apothecaries, senior Physicians, and Surgeons, Mates, Purveyors, Clerks, Commissaries, Wardmasters, Servants, Washerwomen, Nurses, Cooks, and all such Officers as shall be necessary for the accommodation of the sick and wounded in the hospitals.

7. That the business of the Commissaries shall be to provide provisions, and liquors, also straw, hay and fuel for the hospitals. Also to bury the dead. He shall likewise provide, and superintend the wagons employed in transporting the sick, and wounded, and the baggage of the hospitals.

The business of the Purveyors shall be to take care of, and distribute the provisions, and other Articles provided by the Commissaries for the sick and wounded both in the camp and hospitals.

8. The business of the Wardmaster shall be to take care of the Arms, Accoutrements, and clothes of the sick and wounded, and to take care that proper attention is paid to the cleanliness of the patients, and their respective wards, rooms, or tents.

9. That one Clerk be allowed to every general hospital, and one Nurse to every ten sick. That

each military hospital be furnished with a number of shirts, sheets, blankets and cases for straw for the accommodation of the sick.

That each regiment be furnished with a number of hospital tents according to their number of men, a full regiment not to have more than six tents.

10. That the pay of the Surgeons and physicians Generals, be four dollars and six rations a day. That the inspector General have five dollars and 12 rations a day. That the pay of the Apothecary General be 3 dollars, and 4 rations a day. That the assistant Apothecaries appointed by the Apothecary General have one dollar and 1/3 per day. That the Purveyors of the hospitals have 2 dollars and 3 rations per day, and that the pay and rations of the hospital Apothecaries, senior Surgeons and Mates of the hospital be the same as formerly established by Congress. That the pay and rations of the senior physicians of each hospital be the same as those of a senior Surgeon.

11. That the pay and rations of the commissaries of the hospitals be the same as the deputy commissaries in the Army.

12. That the pay and rations of the Wardmasters be the same as that of a Commissary.

13. That the pay of the Clerks, Cooks, Nurses, Washerwomen, Servants, &c., be regulated by the Physicians and Surgeons General.

14. That the pay and rations of a regimental Surgeon be the same as those of a Captain and the pay and rations of a Mate be the same as those of a 1st Lieutenant.

15-16. That no senior Physician, or Surgeon, no hospital Mate, nor shall any regimental Surgeon or Mate be appointed in the Army who has not previously undergone an examination before one or more of the Physicians and Surgeons General, or before the Inspector General of the medical department.

17. That a Sergeants guard be constantly placed at each general hospital to prevent the unnecessary visits of Strangers, and the desertion of convalescent patients, and to assist, if necessary in enforcing the rules, and orders of the Surgeons, and physicians of the hospitals.

18. That the Officers of the several regimental companies to which the sick and wounded belong be ordered to concur by means of their Authority with the Surgeons and physicians in taking care of their respective Soldiers.

19. That the physicians and Surgeons General with the Inspector General of the medical department be authorized to make such further improvements in this plan for regulating the medical department as the exigencies and situation of the Army may make necessary, and that they report the same when made to Congress for their Approbation.

20. That it be recommended to each of the States to make suitable provision for the maintenance of such maimed, and incurable Soldiers and Seamen as shall be discharged from the service of the united States.³⁰

Ordered, To lie on the table.

²⁹ This plan, in the writing of William Shippen, is in the *Papers of the Continental Congress*, No. 22, folio 9. It was prepared by Thomas Shippen and John Cochran, and was transmitted to Congress by Washington, February 14, 1777.

³⁰ This report, in the writing of Benjamin Rush, is in the *Papers of the Continental Congress*, No. 22, folio 1. Against paragraphs 1, 2, and 4 is written "Query if necessary."

March 15, 1777. 180

Resolved, That as Congress proceeded to the dismissal of Doctor Stringer, upon reasons satisfactory to themselves, General Schuyler ought to have known it to be his duty to have acquiesced therein:

Resolved, That the suggestion in General Schuyler's letter to Congress, that it was a compliment due to him to have been advised of the reasons of Doctor Stringer's dismissal, is highly derogatory to the honour of Congress; and that the president be desired to acquaint General Schuyler that it is expected his letters, for the future, be written in a stile more suitable to the dignity of the representative body of these free and independent states, and to his own character as their officer.

March 19, 1777. 186

Resolved, That the extract of Mr. Deane's letter, relative to Dr. Williamson, be referred to a committee of five, who are empowered to send for Dr. Williamson and examine him:

The members chosen, Dr. (John) Witherspoon, Mr. (Jonathan Bayard?) Smith, Mr. (George) Clymer, Mr. (James) Wilson, and Mr. (Thomas) Heyward.

March 22, 1777. 193

The report of the Medical Committee was taken up and considered; (and, after debate,) Whereupon,

Resolved, That said report, together with Dr. Shippen's plan, be recommitted.

Resolved, That a committee of five be appointed to devise ways and means for preserving the health of the troops, and for introducing better discipline into the army:

The members chosen, Mr. (Oliver) Wolcott, Mr. (Daniel) Roberdeau, Dr. (John) Witherspoon, Mr. (Samuel) Adams, and Mr. (Abraham) Clark.

March 24, 1777. 197-200

The Medical Committee, to whom the plan of the general hospital was recommitted, brought in a report, which was read:

The Medical Committee, having taken into their consideration the establishment of the medical department in the Army, Report as follows:

1st, That to each regiment there be appointed one Surgeon and one Surgeon's Mate, who shall constantly attend the Regiment, to afford present relief to the sick and wounded, and take care of such as it may be proper to remove to the hospital.

2nd, That Senior Surgeons of approved Abilities in Physick and Surgery be appointed to each Brigade or a greater number of Regiments as the General commanding in each department or grand division of the Army shall judge necessary; whose business shall be, to Superintend the Regimental Surgeons and Mates, see that they do their duty, advise and direct them in all difficult cases, and direct or perform all Capital Operations, give Assistance to the director of the hospital when such assistance is necessary; direct the Commissary of the Sick in the Articles Necessary to be procured for the Sick and wounded out of the hospital, and see that the Commissary, purveyor and Nurses Regularly perform their respective duties, and provide proper

Nurses to attend the sick when Necessary; and also from Time to Time furnish the Regimental Surgeons with such Medicines and instruments as they may have Occasion for out of those furnished them by the Apothecaries, taking receipts for the same, and render Accounts of all medicines and instruments by them received or delivered out when required thereto by Congress.

3rd, That a Commissary for the Sick be appointed to attend each grand division of the Army, who shall appoint one or more assistants if necessary, whose business it shall be to purchase and deliver to the purveyor all such Provisions, Liquors, and other necessities for the Sick and wounded as directed by the Senior Surgeons, and keep accounts of and take receipts for the same: he shall provide Straw, hay and fuel for the hospitals, and have the care of burying the Dead: he shall furnish the hospital with such a number of shirts, sheets, blankets, and cases for straw for the Accommodation of the Sick as the General commanding in such grand division of the Army shall direct: he shall likewise provide or obtain from the Quarter master general a proper number of hospital tents for the Sick in case the Army is likely to be stationed in places where houses convenient cannot be obtained for that purpose: and also provide and Superintend the Waggon necessary to be employed in removing the Sick and wounded, the number of hospital tents and Waggon necessary for the above purposes to be fixed and ascertained by the Generals commanding each division, and certified under their hands respectively: of all which Articles above enumerated, when provided, the Commissary shall take proper receipts and vouchers proving that the same were furnished, which he shall lay before Congress when required.

4th, That one Purveyor be appointed to attend each grand division of the Army, with one or more Assistants if necessary: whose duty it shall be to receive from the Commissary, take care of and distribute the provisions and other necessities provided for the sick and wounded in such manner as the Senior Surgeons shall direct: which provisions and necessities are to be delivered in lieu of well rations.

5th, That the General commanding in each Department or grand division of the Army, direct one hospital to be provided in some Convenient place contiguous to the Army consisting of different or separate houses, if such can be had, in order that the wounded may be kept apart from the sick, and also that: he sick may be properly divided, as may be most conducive to their recovery: to which hospital all such sick and wounded are to be sent as the Senior Surgeons may think proper, and whose circumstances will admit being removed, which hospital shall be supplied by the Commissary for the sick, with such provisions and other necessities for the use of the sick and wounded, as the director shall require in lieu of well rations.

6th, That one director of approved skill in Physick and Surgery be appointed for each hospital, who shall have the liberty of appointing one assistant Surgeon and four mates; a purveyor and such a number of Washerwomen and Nurses as he shall

judge necessary for the comfortable accommodation and attendance of the sick and wounded under his care, always observing that no more than necessary are employed. Also that the director May call to his assistance one or more of the Senior Surgeons when the number of sick and wounded in the hospital requires such assistance. Also that the director take an Account of each of the sick and wounded under his care, with the Time of their coming to the hospital, and when discharged, or deceased: and also of the Number of attendants employed in Nursing and taking care of the sick: and make due returns thereof every month to the general commanding in each grand division of the Army to be by him transmitted to Congress.

7th, That there be two Apothecaries, one in the middle, and one in the eastern department, whose business it shall be to receive all such Medicines and instruments as shall be procured by the Secret Committee, and to purchase such others as they shall direct. That the Apothecaries prepare and put up such medicines and instruments for each hospital, and for each Regimental Surgeon, and also for each Senior Surgeon to be used by them or dealt out to the Regimental Surgeons when needed, as the medical committee shall direct, and forward the same with Supplies from Time to Time agreeable to their orders, keeping exact accounts and taking proper receipts for the same to be laid before Congress when required. Each Apothecary to be allowed one mate.

8th, That the sick and wounded as well in the Army as in the hospital be kept separate from each other, when circumstances will admit thereof; and that the sick be always placed at such a distance from those in health as to prevent the spread of infection in the Army.

9th, That the pay of the medical department be as follows—

The director of the hospital dollars per month
and rations per day.

The Senior Surgeons and assistants to the directors dollars per month and rations per day each.

The Apothecaries dollars per month and rations per day each.

The Regimental Surgeons dollars per month and rations per day each.

The directors Apothecaries and Surgeons mates dollars per month and rations per day each.

The Commissary of the sick dollars per month and rations per day each.

The Purveyors dollars per month and rations per day each.

The Assistant Commissaries and Assistant Purveyors dollars per month and rations per day each.²¹

Ordered, That it be referred for consideration to morrow morning.

This report, in the writing of Abraham Clark, is in the *Papers of the Continental Congress*, No. 22, folio 15.

March 27, 1777. 206

Congress resumed the consideration of the report of the Medical Committee on the hospital;

Resolved, That it be [referred to a Committee of the Whole. Congress then resolved itself into a Committee of the Whole, to take into consideration the report of the Medical Committee, and after some time, the President resumed the chair, and Mr. (Daniel) Roberdeen reported] re-committed.

April 2, 1777. 219

Congress resumed the consideration of the report of the (medical) committee on the hospital, and, after debate,

Ordered, That the said report lie on the table (for farther consideration).

Resolved, That a committee of three be appointed to revise Dr. Shippen's plan for the regulating the hospital, and report thereon.

The members chosen, Mr. (Elbridge) Gerry, Mr. (Thomas) Burke and Mr. J(ohn) Adams.

April 4, 1777. 225

The Committee on the hospital, brought in a report, which was taken into consideration, and after debate,

Resolved, That the farther consideration thereof be postponed till to morrow.

April 5, 1777. 227

Congress resumed the consideration of the report on hospitals, and, after debate,

Resolved, That the farther consideration be postponed till Monday next.

April 7, 1777. 231-7

Congress resumed the consideration of the report on the hospital; Whereupon,

Resolved, That there be one director general of all the like weekly returns to their respective directors, *mutatis mutandis*:

That the deputy directors general cause the like returns to be made, once every month, to the director general, together with the names and denominations of all the officers in the respective hospitals:

And that the director general shall make a like return for all the hospitals and armies of the United States, once every month, to the Medical Committee:

That the Medical Committee have power to appoint any of their members to visit and inspect all or any of the medical departments, as often as they shall think proper, to enquire into the conduct of such general officers of the hospital as shall be delinquent in this or any parts of their duty, and to report their names to Congress, with the evidence of the charges, which shall be brought against them.²²

Resolved, That the farther consideration of the report be postponed till to morrow.

²² This report, in the writing of Thomas Burke, is in the *Papers of the Continental Congress*, No. 22, folio 19.

(Continued in the next issue.)



EDITORIAL

THROUGH the courtesy of Colonel William O. Owen, Curator, Army Medical Museum, Washington, D. C., we are able to print, in this number, the first installment of the complete procedure of Congress in regard to the organization of medical service during the War of the Revolution (1775-83). As archival material of greatest value for the earlier medical history of our country and of interest to all American physicians of colonial extraction, we regard it as a privilege to print this record, lengthy as it is. It shows exactly what Congress did or did not do for military medicine in the most crucial period of our history. In this connection, however, it would seem apposite to specify our intention in regard to the printing of material of this kind in future. Any archivistic material of exceptional national and historical importance, if not too extensive, will be most welcome in these pages. Really valuable material of this kind is excessively rare in this country. We cannot, however, engage to print the archival histories of medicine for separate states, counties, cities or smaller localities. This we conceive to be the proper function of the journals of the state medical societies, the city and county journals, and the local periodicals devoted to medical history. Moreover, these separate histories have already been very well taken care of for some of the several states, cities and counties, whether in book or periodical form. Dr. Stephen Wickes,

for instance, wrote the medical history of New Jersey (1879); Dr. Samuel Abbott Green, the medical history of Massachusetts (1881), and of Groton, Mass. (1890) in particular; Dr. Eugene F. Cordell, the "Medical Annals of Maryland, 1799-1899" (1903). Drs. Samuel C. Busey and Daniel S. Lamb have covered the medical history of the District of Columbia in several volumes; Dr. Frederick P. Henry wrote the medical history of Philadelphia (1897). Dr. Otto Juettner has given an exhaustive history of medical Cincinnati in his "Daniel Drake" (1909). Old medical New York has been the theme of memoirs by John W. Francis (1858), and Francke Huntington Bosworth (1898). Early medical Chicago has been treated by James Nevins Hyde (1879) with subsequent material in the earlier numbers of the *Bulletin of the Medical History Society of Chicago*. The story of the Boston Society for Medical Improvement was given by the late Dr. James G. Mumford (1901). Old medical Boston is in the hands of Mr. James F. Ballard of the Boston Medical Library. Medical histories of all our important states and cities will undoubtedly appear in course of time, and it should be a matter of local pride and patriotism to have them completed and printed in each particular locality. We cannot engage to cover this extensive field, but we would particularly solicit such archival material as unpublished letters of great physicians and surgeons—particularly those of which

the content is of historical and biographical importance—brief autograph letters of medical celebrities for reproduction in facsimile, rare photographs of eminent physicians not heretofore reproduced, rare engravings and prints of the same description, and other medical curiosities which may

stimulate interest in our subject or serve as basic material for future historians. We realise that this is a new departure, and in the absence of such old medical manuscripts as Europe abounds in, we solicit the help of our subscribers and contributors.

MEMORIAL NOTICE SIR MARC AMAND RUFFER

KT., C. M. G. (1859-1917)

Original investigation in medical history of late years has been furthered in remark-

able ways by archæologists, anthropologists, numismatists, antiquarians, collectors of engravings, sinologists, Egyptologists, and particularly by travellers and explorers. Indeed, the journey method of Sudhoff goes to show that he who enjoys the advantages of travel is much more likely to turn up new facts than the stationary investigator. One of the most prominent exponents of this new tendency was Sir Marc Amand Ruffer, late President of the Sanitary Council of Egypt, who died at sea during the spring of 1917 on his return from Salonika, whither he had gone to reorganize the sanitary service of the Greek Provisional Government. He made his mark in the medical history of ancient Egypt by his contributions to its palæopathology, in particular

the palæohistology of the pathological lesions found in mummies of the XVIII-XXVII dynasties.



SIR MARC AMAND RUFFER (1859-1917)

He was born at Lyons, France, in 1859, the son of the late Baron Alphonse Jacques de Ruffer. His mother was a German. He was educated at Brasenose College, Oxford, where he took his B.A. degree in 1883, and at University College, London, becoming bachelor of medicine and surgery in 1887 and M.D. in 1889. He then became a pupil of Pasteur and Metchnikoff at the Pasteur Institute, devoting special study to the then novel subject of phagocytosis. In his papers of 1890, he gave an early and timely exposition of Metchnikoff's concept of inflammation as a

protective mechanism against infection, particularly in the intestinal canal. He described the diphtheritic membrane as "a battlefield," in which pathogenic bacteria

and ameboid leucocytes contend for mastery. In 1891, Ruffer became the first director of the British Institute of Preventive Medicine, his assistant being Professor Henry G. Plimmer. At Metchnikoff's instance, Ruffer and Plimmer took up the study of cancer and established the provisional status of the quasi-parasitic formations in cancer cells. While testing the new diphtheritic serum at the Institute, both Ruffer and Plimmer fell victims to the disease, and Ruffer was so severely smitten with the paralytic sequelæ that he felt compelled to resign his directorship. He then went to Egypt for recuperation and subsequently took up his permanent residence at the Villa Ménival, Ramleh.

Ruffer was one of the ablest organizers of medical administration in recent times. He did much to make the present Lister Institute what it is to-day, became professor of bacteriology in the Cairo Medical School (1896), which he reorganized, and was the president of the Sanitary, Maritime and Quarantine Council of Egypt (1901-17), in which office he was instrumental in ridding Egypt of cholera by rigorous hygienic policing of the routes of pilgrimage at the Tor Station and elsewhere. In this work, he enjoyed the confidence and support of both Lord Cromer and Lord Kitchener. He served on the Indian Plague Commission, was Egyptian delegate to sanitary conferences of 1903, 1907 and 1911, and from the outbreak of the present war, was highly efficient as head of the Red Cross in Egypt. He was the recipient of many honors and decorations, and was knighted in 1916. A man of the world in the widest sense, he was a remarkable linguist, a talented violoncellist, and an expert at his favorite game of billiards.

In December 1908, in connection with the excavations made in Nubia by Elliot Smith, Wood Jones and Derry prior to the flooding of the country by the raising of the Assuan dam (1907), Ruffer began

to exhibit microscopic sections of pathological lesions in mummies at the Cairo Scientific Society. In this field, Fouquet was the pioneer (1889), but Ruffer made it his own by his expert skill in microtomic technique and staining methods. To overcome the hard, brittle and friable character of the tissues, before cutting with a Minot microtome, he softened them in a solution of alcohol and sodium bicarbonate, with subsequent hardening in alcohol. For this new branch of pathological histology he devised the term "palæopathology." His "preliminary note" of 1909 (*Brit. Medical Journal*, 1909 I, 1905) was followed by a striking series of papers on the presence of *Bilharzia hematobia* in Egyptian mummies of the XX dynasty, 1250-100 B.C. (*Ibid.*, 1910, I, 16), on a varioloid eruption in the skin of a mummy of the same period (*J. Path. & Bact.*, Cambridge, 1910-11, XV, 1-3, 1 pl.), on arterial lesions in mummies of 1580 B.C.—525 A.D. (*Ibid.*, 453-462, 3 pl.), on the osseous lesions in Egyptian skeletons, ranging from 2980 B.C. to the Greek period (*Ibid.*, 1911-12, XVI, 439-495, 9 pl.) on dental, osseous and articular lesions in Coptic bodies of 400-500 A.D. (*Ibid.*, 1913-14 XVIII, 149-162, 6 pl.) on a tumor of the pelvis from the catacombs of Komel Shougafa, 250 A.D. (*Ibid.*, 480-484, 2 pl.) and a monograph on "Histological Studies in Egyptian Mummies" (Cairo, 1911). In 1910, Elliot Smith and Ruffer described a case of Pott's disease in a mummy of the XXI dynasty, circa 1000 B.C. (Giessen, 1910), perhaps the earliest landmark we have in the history of tuberculosis. In these studies, Ruffer showed the presence of calcified *Bilharzia* eggs in the kidneys of two mummies, a common cause of prehistoric hematuria, as shown in the hieroglyphs and medical papyri; also the common occurrence of arthritis, spondylitis deformans, dental caries, rarefying periodontitis, pyorrhœa alveolaris, Bouchard's nodes, malarial enlargement of the spleen,

biliary calculi and particularly arteriosclerosis (atheroma) which was found even in the aorta of Rameses II, and was as frequent 3000 years ago as it is to-day. Its causation Ruffer leaves an open question, since, in his view, alcohol, tobacco, meat diet, strenuous exercise and "wear and tear" could, none of them, have availed to produce it. His final studies of dental and osseous lesions in specimens dug up at Faras (100 B.C.-300 A.D.) and at Merawi

(750-500 B.C.) in the Sudan (*Sudhoff's Mitth.*, 1914, XIII, 453) lead him to the conclusion that these people were short-lived, dying before 50. The war interrupted Ruffer's work, which was cut short forever by his untimely death, but he had already prepared a volume of antiquarian studies for the press which will probably be a permanent record of his unique and memorable discoveries in palæopathology.

F. H. GARRISON.

ANTYLLUS ON ANEURISM

There are two kinds of aneurysm. In the first the artery has undergone a local dilatation; in the second the artery has been ruptured. The aneurysms which are due to dilatation are longer than the others. The aneurysms by rupture are more rounded. To refuse to treat any aneurysm, as the ancient surgeons advised, is unwise; but it is also dangerous to operate upon all of them. We should refuse, therefore, to treat aneurysms which are situated in the axilla, in the groin and in the neck, by reason of the volume of the vessels and the impossibility and danger of isolating and tying them. We should not touch an aneurysm of large volume even when it is situated in some other part of the body. We operate in the following manner upon those which are situated upon the extremities and the head: If the aneurysm be by dilatation, make a straight incision through the skin in the direction of the length of the vessel, and, drawing open by the aid of books the lips of the wound, divide with precautions the membranes which cover the artery. With blunt books we isolate the vein from the artery, and lay bare on all sides the dilated part of this last vessel. After having introduced beneath the artery a probe, we raise the tumor and pass along the probe a needle armed with a double thread in such a manner that

this thread finds itself placed beneath the artery; cut the threads near the extremity of the needle, so that there will be two threads having four ends; seizing, then, the two ends of one of these threads, we bring it gently toward one of the two extremities of the aneurysm, tying it carefully; in like manner also we bring the other thread toward the opposite extremity, and in this place tie the artery. Thus the whole aneurysm is between the two ligatures. We open then the middle of the tumor by a small incision: in this manner all which it contains will be evacuated, and there will be no danger of hemorrhage.

To tie, as it has been advised, the artery on both sides the vein, and then to extirpate the dilated part which finds itself between, is a dangerous operation; frequently, in fact, the violence and tension of the arterial pneuma push off the ligatures.

If the aneurysm owes its origin to the rupture of the artery, we isolate with the fingers as much of the tumor as we can, including the skin, after which we pass underneath the isolated part the needle with the double thread and proceed as before; after which the tumor may be opened at its summit and the superfluous portion of the skin cut away.

Oribasius.



Finch kept a note book and would now and then write in it some rather melancholy and entirely non-compromising poems.

About this time Finch took a trip to Rome and Naples with his nephew, leaving behind for the first time poor Dr. Baines, who was suffering from stone and also from a tremor which prevented his writing very much. In 1670, the doctors gave up Italy and returned to England, living at the Inner Temple with Sir John's elder brother, Chancellor Heneage Finch.

Most of the writing quoted in this book was done by Dr. Finch. We suspect that Dr. Baines was the cleverer man, and the more important of the two; but he did not have quite the social connections of Dr. Finch. Dr. Malloch thinks that perhaps he had paralysis agitans, as he had a tremor all his life, but this is unlikely for he could not have lived with it to such an age.

In 1673 Finch was made ambassador to Turkey, and he and Baines sailed for Constantinople. While there he wrote often to his sister; and his journal contains notes of persons met, and of discussions, mostly religious in character. The friends had dropped out of medicine.

Baines died in 1681, aged 57, of a tertian ague. Sir John Finch has a touch of superstition, and he makes this curious note regarding the demise of his friend:

"Two things I cannot omitt. The first is that Sir Thomas and I sitting at table in our gallery at Pera, after supper, about a year before his death, there was a loud knocking upon the round table wee sat at, for near the space of a quarter of an hour. We called in three servants, my secretary, Derham, and Zacar, which last, astonished at the thing threw off the carpet (i.e. the table cover) and crept under the table; and then the knocking seemed to be above the table: as it seemed to us to be underneath it.

"The second was that about foure dayes before Sir Thomas his sicknesse, one of my dentes incisores dropt out of my head with-

out any pain whilst wee dined together; which seemes to confirm the interpretation of those who make the dreaming of the losse of a tooth to be the prediction of the losse of a friend."

Sir John and Sir Thomas lived together for 36 years, and in very intimate friendship for 26 years. At the time of Baines's death Sir John wrote a "dedication" to him. It is a touching and eloquent tribute to his friend and to friendship.

"But lastly Sir when I consider that of the twenty-six years wee spent together since wee first left England, that wee never have been separated two months from each other unlesse it were in the exercising some act of kindnesse though two and twenty of them spent in foreign parts: . . . when I consider your inimitable as well as unrequitable friendship though you were wracked with stone and tormented by the gout, inspiring you with courage to accompany me in your declining years and strength all this length of time and voyage: the greatest temporall blessing could have befallen me—so that I may say as truly of you as Aneas did Anchises, and I doe say more affectionately,

*Ille meum Comitatus iter maria omnia
mecum*

*Atque omnes Pelagique minas coelique
ferebat*

Invalidus vires ultra sortemque Senectae.

When dear Sir I consider all this, I find that under all the ties of honour, friendship, gratitude and justice, you are entitled to this dedication. . . ."

Finch did not long survive his friend. He died of pleurisy in 1682.

CHARLES L. DANA.

DR. LYMAN SPALDING, THE ORIGINATOR OF THE UNITED STATES PHARMACOPEIA; Co-laborer with Dr. Nathan Smith in the founding of the Dartmouth College Medical School and its first Chemical Lecturer; President and Professor of Anatomy and Surgery of the College of Physicians and Surgeons of the Western District, at Fairfield, N. Y. By his Grandson, Dr. James Alfred Spalding. W. M. Leonard, Boston, 1916. 8vo, pp. 379.

This book tells the story of the life and achievements of an interesting character who lived a hundred years ago. The book is full of letters and reminiscences connected with the prominent physicians of New England, and of New York and Philadelphia during that time. To those who are interested in the customs and habits of life of medical men of America during this period, and in the teachings of the professors and in the development of medical and scientific education, the book will afford instruction and very great entertainment. The names and doings of Drs. Nathan Smith, Shattuck, Warren, Ramsay, Mitchell and Waterhouse are most frequently mentioned, but there is hardly a notable of that period who is not referred to. Dr. Spalding evidently mingled with and knew well the Fathers of American Medicine.

He gives many interesting notes of lectures by famous surgeons and physicians. Here is one:

"At a lecture by Dr. V. Physick a patient with unreduced dislocation of the femur was brought in for reduction. After counterextension and rotation, the neck of the femur broke to the confusion of the surgeons and the amazement of the class. 'I go next, said Dr. Physick without apparent interruption, 'I go next to speak of strangulated hernia in which a high enema of tobacco is better than tobacco smoke.'"

The book contains several illustrations including a portrait of the hero of the *Pharmacopœia*, and reproductions of autograph letters by eminent physicians.

CHAS. L. DANA.

AN INTRODUCTION TO THE HISTORY OF MEDICINE, with Medical Chronology, Suggestions for Study and Bibliographic Data. By Fielding H. Garrison, A.B., M.D., Principal Assistant Librarian, Surgeon-General's Office, Washington, D.C. Second Edition, Revised and Enlarged, Illustrated. W. B. Saunders Company, Philadelphia and London, 1917. Octavo, pp. 905. Cloth.

We welcome with much satisfaction this second edition of Dr. Garrison's popular "Introduction to the History of Medicine," no doubt the best history of any substantial length, which has been published in English. Such a work, we need hardly say, of very solid labor, can only be accomplished by an exceptional combination of diligence and zeal. Indeed, the term "zeal" is too faint; we might substitute enthusiasm or self-sacrifice and yet not go beyond the mark.

The American physician has only just discovered as it were, new veins of gold, opened up by Sudhoff, Neuburger, Sticker, Wickersheimer, Allbutt, Curtis, Singer and others in the study of the history of medicine, and the mine is being eagerly worked. Dr. Garrison is a sympathetic writer who grasps the leading features of medical history and delivers his impressions with clearness and ease, never losing sight for a moment of his main theme. One is astonished to find within the covers of a single volume the exhaustive and rich amount of material given in such a brief manner.

In the preface he quotes from a private letter of Dr. Charles Singer (Oxford), who says: "The history of medicine is a history of ideas, and biography is only of value in so far as it bears on ideas. The history of medicine is not concerned with tattle about the lives of the great, nor with the absurdities of ancient error, nor with the quaintness of antique expression." The time is not yet very long past when a historical work, especially an elementary and popular work, was scarcely anything but an endless series of names, dates and facts arranged in regular succession. Now, however, our conception is changed. We ask of the historian, not to load our memory with facts but to recall the dead past to life, to give us a vivid, animated, and truthful picture of the times that are no more. We require him to make us live the life of our medical forefathers; to initiate us into their ideas, their beliefs, their passions; to disclose to us all the motives good

or evil, on which they acted; to reveal to us their virtues and vices; and we thus say of the historian, what used to be said only of the poet, that he must be a painter. No small part of the charm of the literary excellence of the book is due to the character painting which our author indulges in.

Not only in the case of a long and detailed history, made as complete as possible, but even of a summary, an elementary book, the object of which is to narrate briefly in one short volume the whole history of medicine, we do not accept a simple record of dry and lifeless facts, but require the author to present us a picture addressing the imagination as much as the memory, and enabling us to understand what were at various periods the manners, the intellectual conditions, the character, the tendencies of periods, which is the subject of his work.

Such, then, is the end which the author of this "Introduction to the History of Medicine" has kept in view, and this end he seems to us to have attained. Drawing his inspirations from Osler, Baas, Pagel, Sudhoff, Neuburger, and other authorities, he has composed a scholarly and delightfully entertaining account of the development of medicine from the ancient and primitive period to the present. He has composed an attractive story, which, while easy reading, is fully adequate to instruct the readers for whom it is intended, and to prepare for more complete studies those who wish a more minute acquaintance with a special period or subject. For this purpose Dr. Garrison has added three appendices, viz., medical chronology, hints on the study of medical history and bibliographic notes for collateral reading.

The composition of such a book needs much art, and also really scientific knowledge; the author possesses both qualifications and has acquainted himself with the most recent works as shown in his account of Assyro-Babylonian medicine by Professor Morris Jastrow of the University of

Pennsylvania. The medical features of the cuneiform inscriptions of the Assyrians and Babylonians have not been very generally studied and the first good account of Assyro-Babylonian medicine was given by Professor Jastrow. Although not a physician, he has paid much attention to the subject, and students of medicine are indebted to him for some clever discoveries therein. We admire his patience and learning displayed in collecting and arranging in an understandable order the facts which he has gleaned from the broken fragments of the clay libraries of Nineveh and Babylon. It is hardly necessary to say that this crude material needs interpretation of the kind Jastrow has given. Many other investigations not accessible in the first edition are also considered. In particular, the researches in ancient medicine of Erwin Rohde, Max Höfler and Max Wellman, those in mediæval medicine by Karl Sudhoff, Neuburger, Wickersheimer and Singer, the investigations in epidemiology of Georg Sticker, the history of pharmacy of Tschirch and Schelenz, the paleopathology of ancient Egypt of Elliot Smith and Wood Jones are very accurately rendered. These are only some of the points of interest touched upon in this entertaining and delightful book.

Dr. Garrison has been extremely fortunate in his position as Principal Assistant Librarian in the Surgeon-General's Office which enables him to take freely from its unlimited resources and treasures. Few English writers, moreover, are so well qualified in a scholarly way for the task of using these references. We are grateful to Dr. Garrison for having taken up and brought to so happy a conclusion the laborious work which he had begun in his first edition. It remains to say that in course of reading steadily through large consecutive portions of the book, we have been led to view it not only as an utilitarian book of reference but as a source of genuine literary pleasure.

MORTIMER FRANK.

VOLUME I

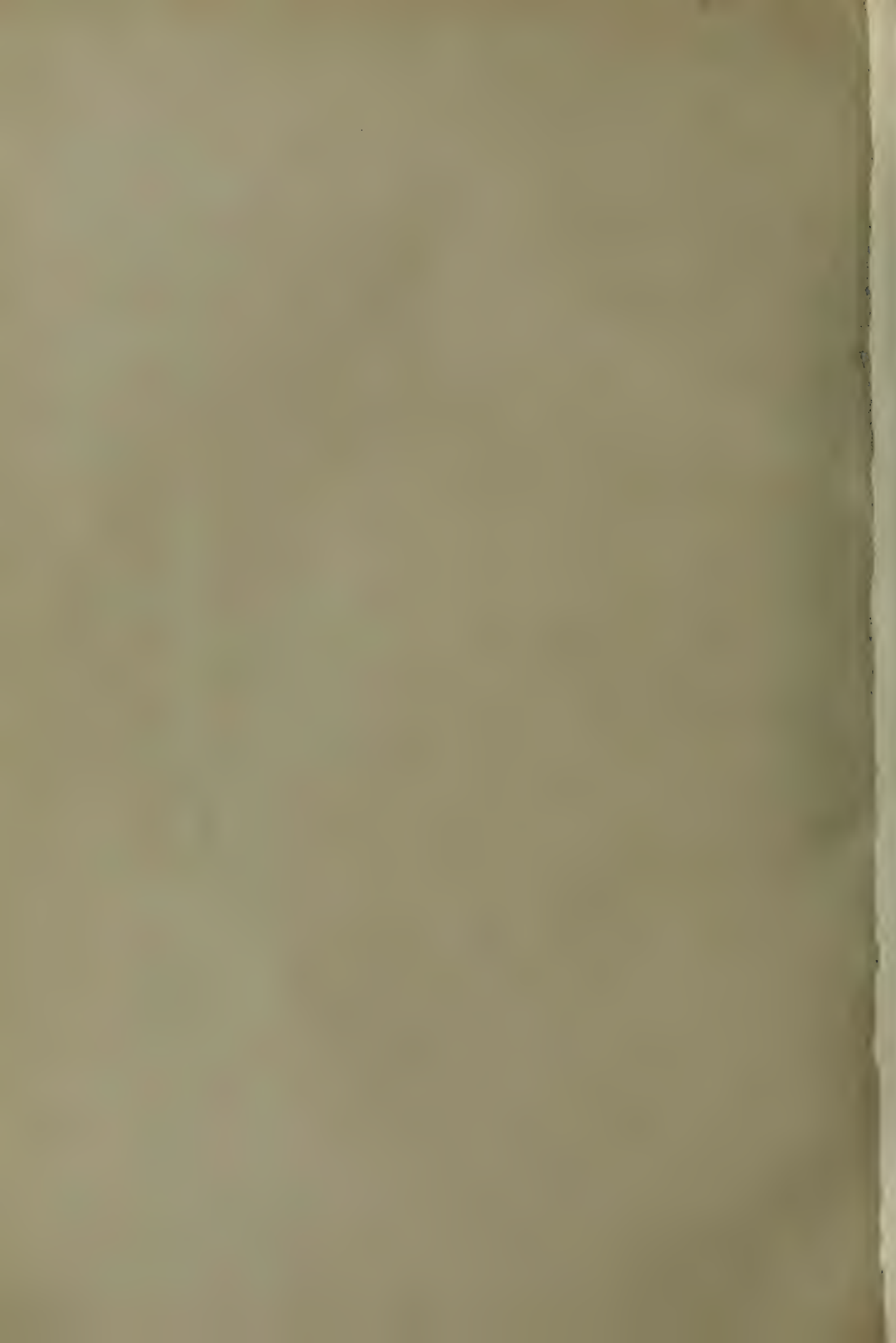
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ANNALS OF MEDICAL HISTORY



VOLUME I

FALL 1917

NUMBER 3

FIGURATIONS OF SKELETAL AND VISCERAL ANATOMY IN THE BOOKS OF HOURS

By

WILFRID M. DE VOYNICH & FIELDING H. GARRISON, M.D.



THE memorable essay of Lessing (1769) and subsequent studies have fairly well proven that the ancients represented death in art in a serene and beautiful way. Parkes Weber has latterly shown that "during the best period of Greek art the realistic representation of skeletons and corpses was avoided," although, in the later Roman and Græco-Roman figurations, skeletons and shrivelled corpses of skin and bone sometimes occur, as a whimsical *memento mori* device, on gems, vases, wine cups, etc.¹ In these, for instance in the figures of skeletons or shades of dead philosophers on the Græco-Roman silver wine cups of the Boscoreale treasure in the Louvre,² the device is

humorous, signifying, Parkes Weber maintains, a degraded Epicureanism. But the ancients never used the skeleton or the shrivelled skin-and-bone larva as a symbol of Death itself. This, as Parkes Weber insists, was an innovation of the Middle Ages. Mediæval figurations of dancing and tipsy skeletons occur in plenty, it is true, but, by the time of Holbein, the skeleton had become the sign and symbol of Death as the King of Terrors.

The question arises: Were these skeletal symbols of Death a survival of the Epicurean Græco-Roman figurations, or were they derived from the drawings in the manuscript illustrations of anatomy of the Middle Ages? That the artists of the Middle Ages should have figured Death as a skeleton, with scythe or drum, is easy of explanation. Death was at hand everywhere. The long succession of devastating wars and epidemics following the downfall

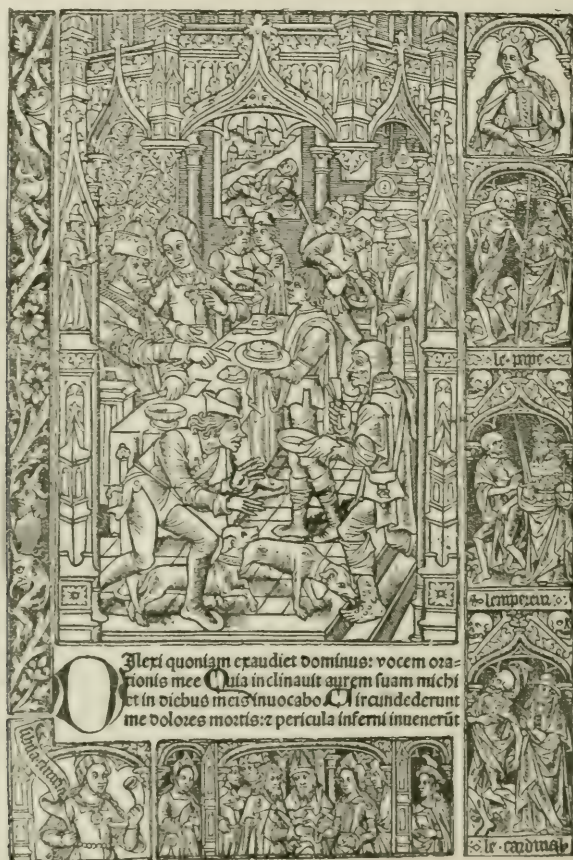
¹ F. Parkes Weber: "Aspects of Death in Art and Epigram," 2. ed., London, 1914, 15-21.

² *Ibid.*, p. 18.

of the Roman Empire had paralyzed hope and human endeavor, and the thoughts of mankind were constantly turned towards mortality. But the very character of some

upon anatomy, Streeter infers that these artists acquired their interest in dissecting in precisely this way:

"How these easy intimacies arose be-

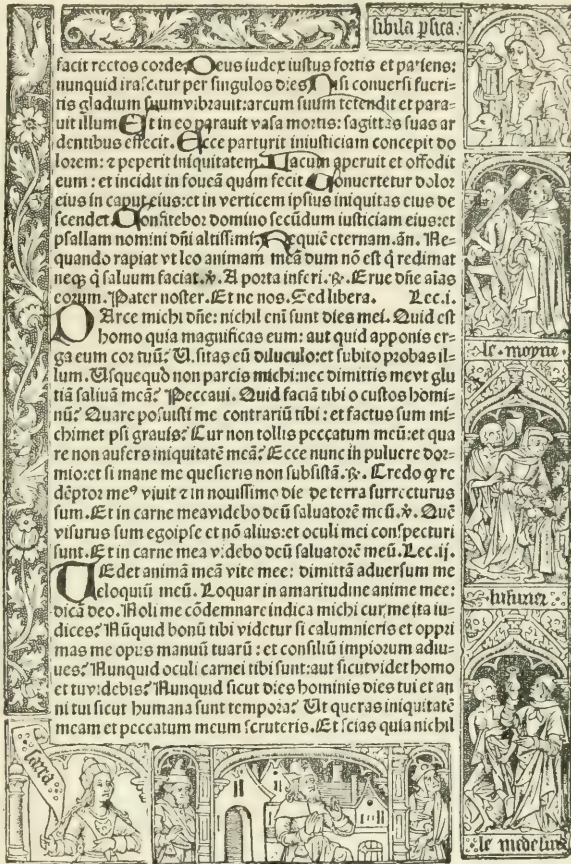


of the early mediæval figurations of Death suggest kinship with the ms. anatomical drawings of the same period, and it is possible that the mediæval artists may have acquired this peculiar type of decorative scheme not beautiful in itself, from association with physicians who were studying anatomy by means of dissection. In his interesting study of the influence of the Florentine painters of the Quattrocento

tween physic and the figurative arts would be hard to explain in any other way than the one I shall attempt to use, simple and obvious as it is! It was by the hazard of association in one and the same guild that the anatomists and artists of Florence made their magnetic contacts. The painters formed a sub-membrum of the 'Guild of Physicians and Apothecaries.' They all belonged—Giotto, Masac-

cio, Castagno, Ucello, Verrocchio—to the membrum pictorum of the Guild of Physicians and Apothecaries. Masaccio joined the guild first as an apothecary

together in all the multifarious guild functions; they sat together in the guild Council; walked together under the same banner in pageants. It cannot, therefore,



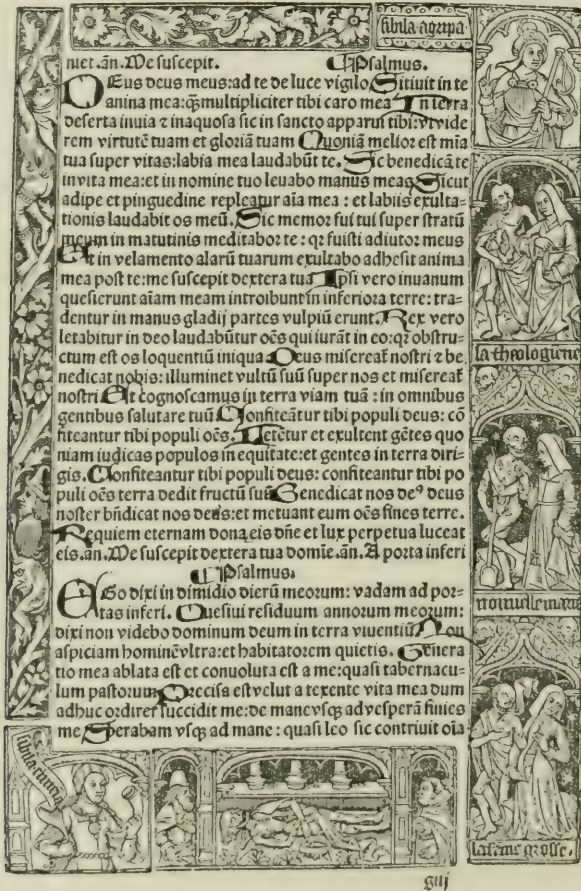
(in 1421, at the age of 19); then he matriculated under the membrum pictorum (in 1423). You see, the apothecaries included color handlers, the 'spetiarii, qui emunt, vendunt et operant colores et alia ad membrum pictorum spectantia memoratum' (apothecaries who buy, sell and deal in colors and other materials needed by the artists). By virtue of this affiliation the artists and doctors were thrown

be a matter of surprise to learn that Giotto was a friend of Dino del Garbo and Torrigiano, or that Luca della Robbia (almost 200 years later) was a friend of the founder of pathological anatomy, Benivieni, although the latter was almost half a century (49 years) younger than Luca."³

³ E. C. Streeter: *Johns Hopkins Hosp. Bull.*, Balt., 1916, xxvii, 118.

Some light upon this question is afforded in the skeletal and other anatomical figurations in the illuminated and printed "Books of Hours," from which the pious recited their

of the "Books of Hours," and the best in artistic merit, particularly the illuminated mss., are of French design, tasteful and charming in conception and execution.

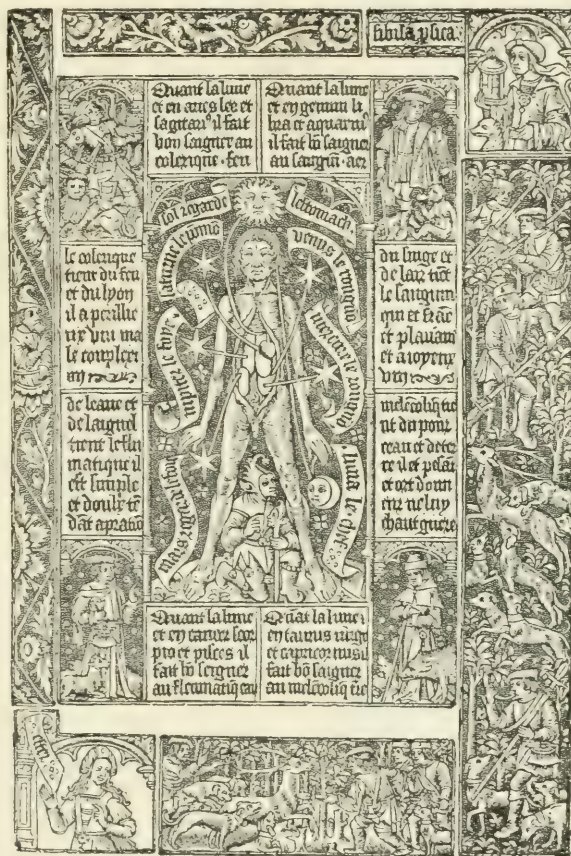


matins, lauds, vespers, and the other daily exercises of prayer and devotion. There are many different varieties of skeletons in these beautiful mediæval manuals which we hope at some future time to study. For the present, it may suffice to describe a few pages photographed from a manual of the *horæ canonicæ* printed at Paris in 1501 by Pigouchet (Plates I-IV). Most

In the plates herewith presented, it will strike upon the sense of any one that the marginal figurations of death as a half-dissected corpse, as a figure covered with syphilitic or leprous sores, or as a shrivelled *Hautskelett* (Sudhoff's *Lemurengestalt*) were, in all probability, conceived from some other viewpoint than the purely artistic. In the shrivelled figure of Death subscribed

"le pape" in the right-hand margin of Plate I, the abdomen is opened, suggesting dissection. In the lower right-hand corner of the center-piece is a leper, with Lazarus-

covered with syphilitic sores, with a spade, threatening a newly-married wife ("nouvelle marie"), and Death jeering at a pregnant woman ("la feme grosse"). At the bottom



rattle and wallet, a dog licking the sores on his left foot. The skeleton in the lower right-hand corner of Plate II ("le medecin"), grins mockingly at a doctor who is upholding a urine glass. At the top ("le moyne"), grinning Death shoulders a spade. The right-hand marginal ornamentation of Plate III shows an eviscerated Death arm in arm with a nun ("la theologiene"), Death

of the page, a dead eviscerated king, covered with luetic sores, lies with his crown beside him. In the center of Plate IV is a corpse astride a jester, the abdominal viscera being dissected out, with lines extending from the heart, liver, stomach and other viscera to legends in the margin indicating the planets influencing these separate parts, a decorative device plainly derived from

the old zodiacal diagrams for bloodletting and purgation, in which an exposition of planetary influences was frequently combined with schemata of the viscera. That these grotesque figurations should be employed as decorative devices in the otherwise beautiful "Books of Hours," plainly suggests affiliation of the miniature painter with medical men who did dissecting and made anatomical illustrations in MSS. This will seem clear to any one who compares these shrivelled and eviscerated skeleton-larvæ with the twelve anatomical minia-

⁴ Sudhoff: "Studien zur Geschichte der Medizin" (Puschmann Stiftung), Heft 4, Leipzig, 1908, pl. xxiv.

tures of Henri de Mondeville (1314), which Sudhoff has reproduced,⁴ or the shrivelled skeletal larvæ, with jesters between their outstretched legs, from the Shepherd's Calendars (*Calendrier des Bergiers*) of 1495 and 1500⁵ or the Nuremberg skeleton of Richard Helain (1493),⁶ or the Brunswick skeleton of Grüninger (1497).⁷ That there is some connection between these early anatomical figurations and the decorative devices in the "Books of Hours" seems clear, and we hope to trace this connection further back at some future opportunity.

⁵ Sudhoff: *Ibid.*, pl. ix.

⁶ *Ibid.*, p. 46.

⁷ *Ibid.*, p. 48.

THE EXPERIMENT OF WALAEUS

[JOB WALAEUS. *Epistolæ duæ* (1640)]

If we open a vein in a ligated arm and compress or ligate the distal portion near the opening, not a drop of blood comes out: from which we may conclude, apparently, that when blood does flow from the opening, it comes from the direction of the band. Again, when blood is drawn in quantity to the extent that it could not have come from the lower part of the brachial veins, it must have come from arteries not closed by the ligature, and above the opening as the pulse itself indicates. But in order to make this plainer, we have sometimes separated the tissues from a large vein and artery lying above the muscles in a dog's groin so that both were completely exposed. On ligating this vein with a thread we have noticed that the part nearer the vena cava emptied and contracted, while the lower parts swelled extremely towards the leg, so that by reason of its fullness it seemed harder than the artery itself. But directly the ligature was relaxed, the blood mounted upwards on the instant and the hardness and fullness of the vein was vastly diminished; when the artery was ligated, the part near the aorta swelled marvelously

while the distal part was correspondingly diminished; at the same time, if the vein was ligated, it did not swell perceptibly. This has been our common experience. But in order that there might be no manner of doubt, and that we might know what goes on inside the vein, we have elevated the detached vein and artery a little, and have fastened the leg tightly underneath, so that the blood could not be carried up or down by any other vein than the one so lifted. Then, having suspended and elevated the vein with a thread as represented in the figure, we made a little opening above and below the ligature: Instantly the blood from the part farthest from the heart spurted out in an abundant, impetuous jet; while the part beyond the thread and nearer the heart oozed out only drop by drop. From which it seems evident that the blood does not descend from the greater vessels but ascends from the smaller to the larger veins; especially since having ligated the same vein farther from the heart we have seen that not a drop came from the opening from which it had previously jetted forth with such impetuosity.

BABYLONIAN-ASSYRIAN MEDICINE¹

By MORRIS JASTROW, JR., PH.D., LL.D.

University of Pennsylvania

PHILADELPHIA, PA.

MEDICINE among the Babylonians and Assyrians takes its rise from popular experience or perhaps, we should say, from necessity, and, therefore, rests upon popular beliefs as to the cause of disease. That cause forms part and parcel of a most primitive *Weltanschauung* which seeks to explain the universe in terms of life. Life is the one phenomenon which man finds everywhere, in himself and about him. He recognizes life in trees and plants, in wells and streams, in the heavens above—in the sun and moon, in the rain and the storms which come from above—and as a matter of course also in the animals that he sees or with which he comes into contact. Whatever moves must have life, and so he assigns life to the clouds and to the running brooks. Whatever grows and gives fruit has life, and so there is life in the trees and plants; whatever has power is endowed with life, and so there is life in the sun and moon as in animals and in himself. Whether we call this theory animism or prefer some other designation, it represents an early and natural phase of man's thought, closely entwined with his religion and involved in most of the rites which we find to be a part of primitive culture.

It is a part of this early and naïve philosophy to identify all forms of life as of the same quality, or rather as one may also put it, not to differentiate between the various forms and manifestations of life.

¹ The article is based in large measure upon my monograph "The Medicine of the Babylonians and Assyrians," published in the *Proc. Roy. Soc. Med.*, Section for the History of Medicine, 1914, vii, 109-176, which is an enlargement of a paper read before the Royal Society in October, 1913. In the present article, enlarged from a paper read before the Chicago Society for the History of Medicine,

It is the same life that manifests itself everywhere. So far as plants and the animal world are concerned, this identification of all forms of life, though set up in an entirely unscientific spirit, would not be in contradiction to modern biological theories which recognize some connecting link between the lowest form of animal life and the highest form of plant life, but primitive man extends the analogy to inanimate nature—to stones, streams and the heavenly bodies. All life is of the same kind and, therefore, the primitive philosophy assumes the possibility of one form of life passing on to another form—a point of view that is illustrated in the folk tales and myths, so widespread, of men being changed into animals or trees, and vice versa.² This theory survives in advanced forms of religious thought in the doctrine of the transmigration of souls, as in Buddhism, where the same vital essence, it is assumed, may appear successively in a tree, in an animal or in man; in another direction it leads to the belief of the incarnation of a deity in human form—a belief found in many religions.

The primitive theory of animism has a bearing on the earliest view as to the cause of disease. Since physical suffering is an attack upon the vital essence in man, presenting itself as a conflict waged between man and some hostile power, that power is likewise viewed under the aspect of life.

May 5, 1917, I have treated the subject from a somewhat different point of view and have added some new material, to bring the subject up to date.

² For instance, in the Jatakas or the Buddha birth tales, coming down to us as the "Fables of Bidpai," "Æsop's Fables" and in various other forms. The "Metamorphoses" of Ovid and the "Golden Ass" of Apuleius also rest on this popular belief.

The germ theory, so popular in these days of advanced pathology, has an ancient heritage. It forms the starting point of medicine everywhere, for sickness is pictured by primitive man as being due to some active living force that has found its way into the body. The conclusion is a very natural one. In the case of a violent or a shooting pain, the sensation is very vivid that there is something inside which produces the picture, something that must be forced or coaxed out if one is to be relieved—and in many cases this is no doubt true. A cure, therefore, involves the expulsion of the hostile power. Medical treatment is essentially exorcism. This primitive germ theory has, in fact, a great advantage over the modern successor, for to the imagination of primitive man the germ is obliging enough to take on tangible shape. It does not hide itself, as the modern germ insists upon doing, so as to be discernible only when isolated and under the gaze of a powerful microscope, nor must its existence be hypothetically assumed. The ancient germ was not ashamed of itself; it showed its teeth and even its tail and its horns. The germ was a demon, an evil spirit that was sufficiently accommodating to sit for its portrait, and so we have in early art, pictures of these demons that by their terrifying aspect³ suggest the mischief that they were capable of inflicting.

Let me add a description of these demons as found in Babylonian literature:

Evil Rabisu⁴ are they
From the lower world they come forth.
Messengers of Enlil,⁵ the lord of the lands are they.

³ See the illustrations in Jastrow, "Civilization of Babylonia and Assyria," Pl. xxxii.

⁴ Name of a class of demons, meaning "the one who lies in wait."

⁵ The chief deity of Nippur and, in the older period, the head of the pantheon.

⁶ Another class of demons, meaning "the strong one."

The evil Utukku,⁶ who in the open attacks the living;

The evil Alu covering one like a garment;⁷

The evil Etimmu,⁸ the evil Gallu who seizes the body.

Labartu, Labasi, bringing sickness to the body;

Lilu,⁹ wandering about in the open,

Approaching the side of the wandering man,

Imposing wasting disease on his body,

Bringing an evil ban on his body,

Bringing an evil pest into his body,

Bringing evil poison into his body,

Bringing the evil curse into his body.

* * * * *

Ashakku¹⁰ has approached the head of the man.

Namtar¹¹ has approached the throat of the man.

The evil Utukku has approached his neck.

The evil Alu has approached his breast.

The evil Etimmu has approached his stomach.

The evil Gallu has approached his hand.

The evil god has approached his foot.

The seven together have seized him;

They have burned his body like a glowing fire.^{11a}

The Babylonians and Assyrians thus recognized an entire faculty of demons. The age of specialization had set in which assigned a special function to each "germ," though the professional ethics of demonology did not bar the demons from encroaching on the domain of a colleague.

Medical treatment, therefore, was directed towards exorcising the demon as the cure. It remained on this level among the Babylonians and Assyrians, despite considerable progress made in the direction of prophylaxis. Sickness continued to the latest period, in the long stretch of several thousand years covered by Babylonian-Assyrian history, to be viewed as a struggle between the patient and the demon. The theory persisted that the patient was cured when the demon had been thrust out.

⁷ A demon that clouds one's vision.

⁸ A class of demons identified with the "shade" of the departed.

⁹ A storm demon.

¹⁰ The demon of wasting disease.

¹¹ The demon of plague.

^{11a} That is, with a fever, which is regularly spoken of in these texts as a fire.

II

An interesting trace of this point of view is to be found in the Sumerian¹² name for physician which also passed over into Akkadian and thence into other Semitic languages. He is called A-Su composed of two signs, conveying the idea of "one who knows water"—a water expert. The term rests on the prominent part played by water in the exorcising of disease. The water-cure is, in fact, the starting point of medical treatment among the Babylonians.

In the Babylonian-Assyrian incantation texts, of which we have a large number,¹³ the two elements of nature which play the most prominent part in the exorcising of disease are water and fire. Water is viewed under the aspect of a sacred element, symbolizing, as water does in primitive and ancient cults in general, purification from ritualistic uncleanness. Fire is also a sacred element, contact with which purifies, but in Babylonian-Assyrian texts its function is to destroy the demon or the sorcerer as the cause of the disease.

Disease as due to the presence of a harmful demon is regarded as a form of uncleanness. The association of ideas involved in this symbolism is very natural. Water is looked upon as a gift of the gods, suggested by the rain that comes from above. Streams, filling up and overflowing during the rainy season, therefore acquire a special degree of

sacredness. The Nile, the Euphrates and Tigris, the Ganges, the Jordan, the Tiber and the Rhone, as indeed large streams everywhere, are sacred. To this day pious pilgrims bathe in the Ganges and in the Jordan to free themselves from sin. Baptism as a rite of initiation into the covenant of the church is in the direct line of succession to the use of water as a purifying element. The novice must be freed from uncleanness before entering upon a new life. Hygiene and religion thus converge in the early stages of human culture.

An incantation to be recited while sprinkling the patient with water or pouring it over him reads:

The holy ¹⁴ water,
The water of the Euphrates, flowing in a
holy place,
The water that is preserved in the deep,¹⁵
The pure water that is purified by Ea,¹⁶
Seven sons of the deep ¹⁷ are they,
Who have purified it and made it clean and
glisten
Before your father, Ea,
Before your mother Damkina ¹⁸
May he (i.e., the victim or diseased one) become
resplendent, pure, clean.

Or again in an incantation to the god Marduk, the son of Ea, and who as the chief god of the city of Babylon becomes the head of the later Babylonian pantheon:

Marduk, son of Ea.
With holy, streaming water,
With clear, shining water,

Babylonia," London, 1904; and in German, K. L. Tallquist, "Die Assyrische Beschwörungsserie Maqlû," Leipzig, 1894, and Zimmern, "Beiträge zur Kenntniss der Babylonischen Religion," Leipzig, 1901, Part i.

¹⁴ Or "pure." The two terms are synonymous in Babylonian.

¹⁵ That is, by the spirit or god who resides in the waters.

¹⁶ The god of the waters—more particularly of the Persian Gulf.

¹⁷ Seven minor water gods, who are the attendants of Ea.

¹⁸ Consort of Ea.

¹² Sumerian is the designation of the non-Semitic speech represented by the earliest records of the Euphrates Valley; Akkadian is the Semitic speech that became predominant after 2000 B. C. While the Akkadians may have been the earlier settlers, the Sumerians, coming to the Valley as conquerors from a mountain home, imposed their authority and their language on the valley till *circa* 2500, when the Akkadians came to the front, and about 2000 B.C. obtained definite control of the region, though some Sumerian centers continued to flourish after that date. The cuneiform syllabary appears to be of Sumerian origin. See further Jastrow, "Civilization of Babylonia and Assyria," Chapter iii.

¹³ Translations of many of these texts will be found in R. C. Thompson, "Devils and Evil Spirits of

Seven times and again seven sprinkle, purify,
cleanse!

May the evil *Rabisu* pass out!

May he step to one side,

May the good *Shedu*,¹⁹ may the good *Lamassu*¹⁹
attach themselves to his body! ²⁰

By heaven, be ye exorcised!

By earth, be ye exorcised!

The *A-Su* or "water expert" is, therefore, the one qualified by his knowledge to drive the demon away through the use of water as the purifying element. From the circumstance that he rather than the fire expert should have been the one to acquire the general qualities of the physician, we may conclude that the water-cure was probably the older and certainly the most auspicious method of driving out the demon of disease.

In accord with this, we find the deity most prominently associated with the large mass of Babylonian-Assyrian incantations to be the god *Ea*, the god who has his habitat in the deep that surrounds the earth and on which, according to Babylonian views, the earth floats like a rubber ball. The name *Ea* is written with two signs conveying the idea of "water-house," which points to the character of the deity, and also shows that the name was originally a designation of the "deep."²¹ The Persian Gulf as the largest body of water was more particularly regarded as the seat of *Ea*, and the old city of *Eridu*, situated on the Gulf, was the oldest center of his cult. That city is represented by the mound *Abu Shahrein*,²² which has not yet been excavated. When that shall have been done, we will be in a position to solve many a problem connected with the origin of this deity and will no

doubt come across the original incantation ritual of *Eridu*, which is frequently referred to in the later texts at our disposal. "Recite the incantation of *Eridu*," we read in these texts, time and again.

The most common conception attached to *Ea* next to that of "king of the deep" is that of god of humanity. He is depicted as saving man when other gods are angry and irreconcilable. It is *Ea* who reveals to a favorite that the gods intend to bring on a deluge, and tells him to build a ship. *Ea* endeavors even to secure immortality for man, though he fails to do so. This aspect of *Ea* as the friend of humanity is due, largely if not exclusively, to the function of water as the element of *Ea* in exorcising the demon of disease. *Ea* is the real physician and in a sense the only healer. The *Asu* or "water expert" is merely his human servitor, who knows how to secure the coöperation of the god in effecting a cure. One of the forms in which *Ea* was portrayed was that of a huge-sized man—the gods were always pictured as supermen—with fish scales hanging down from the back of the head to the feet, the latter being an appropriate symbol for a water god. The priests of *Ea*, when performing their exorcising ritual, similarly clad themselves in robes resembling fish skins,²³ to indicate that they were the god's representatives, and that their power was due to the supposed transfer of the god's qualities to his vicars. The masquerade was to suggest the transfer.

No doubt the *Asu* also made use of other forms of treatment besides the water-cure, and it may be worth while before passing on to give a specimen from Babylonian-

terra firma, who becomes a "water god" when the Sumerians reached the Euphrates Valley—where water is the most prominent element.

¹⁹ See the map in Jastrow, "Civilization of Babylonia and Assyria."

²³ See the illustrations in Ward, "Seal Cylinders of Western Asia," p. 226 *et seq.*

¹⁹ A protecting spirit.

²⁰ As bodyguards.

²¹ We must, therefore, assume that the god was designated as the "god of *Ea*," i.e., "the god of the water-house" or the god of the deep. The older naming of the deity was *En-Ki*, "lord of the land" or of the fixed abode. As the deity of the Sumerians living in a mountainous country, *Enki* is a god of

Assyrian incantation texts in which fire is introduced as the exorcising element, though, as already suggested from a different point of view. We have two long series of exorcising formulas with accompanying rites, which were known as *Shurpû* and *Maklû*.²⁴ Both terms convey the idea of "burning," and the designation is due to the prominence given in the incantations to the burning of images made of wax or some other substance. These are effigies either of the demons of disease, or of the sorcerer or witch who has control of the demons, and through them bewitches the victim. The burning of the images is supposed by the familiar process of sympathetic magic to destroy the demon or sorcerer (or witch) as the immediate or mediate cause of the disease. One of the incantations in the *Maklû* series reads:

I raise the torch, their images I burn.
The images of the Utukku, Shedû, Rabisu,
Etimmu,
Of Labartu, Labasi, Akkhazu,
Of Lîlu, Lîlîtu and Ardat Lîlî,²⁵
And all evil that seizes hold of men.
Quake, melt, vanish!
Your smoke rise to heaven!
May Shamash,²⁶ destroy your limbs!
May the arch-exorciser, the son of Ea,
(i.e., Marduk) check your strength!

The water treatment by pouring or sprinkling water over the victim is direct, the fire treatment is purely symbolical. The former method was supposed to drive away the demon by purifying the victim of the uncleanness marked by the presence of the demon, the latter to destroy the demon by a process of sympathetic magic, resting on the hope that the symbolic burning of the image would bring about the hoped-for reality.

²⁴ See note 13 above.

²⁵ These are all names for the various classes of demons of disease. See above, p. 232, Lîlîtu—the feminine form of Lîlu—is the female "storm demon"; Ardat Lîlu "maid of Lîlu" is similarly the

III

This burning of an image of a demon or sorcerer or witch introduces a new thought in the primitive treatment of disease which was not implied in the appeal to the water-god Ea, or of his son Marduk, to whom, as the head of the later pantheon, the attributes and powers of the father are transferred. This thought is that certain individuals have the power to superinduce the entrance of demons into the bodies of those singled out as victims. The belief, while widespread in antiquity, would appear to be a stratum superimposed upon the older and more primitive belief that the demons are lurking everywhere, and are at all times ready to strike whomsoever and wheresoever they can. They act independently. The thought of their being under control strikes one as a later development, though still falling within the circle of primitive notions. The "fire" ritual would, therefore, be a later procedure than the water cure. At all events, while the sorcerer as the ultimate source of disease—because of his supposed power to direct the entrance of the demon into the body—is the logical complement of the exorciser as the one who drives the demon out, the real starting point of medical treatment among the Babylonians and Assyrians is the water-cure through the *Asu*, in which, to be sure, sympathetic magic also enters but as a subsidiary factor, whereas in the case of the "fire" ritual, the symbolical rite is the dominating factor. An illustration will make this distinction clearer, and will also show the further steps in the development of the fire ritual.

In the fifth and sixth tablets of the above-mentioned *Shurpû* series, we have a long list of exorcising formulæ in which

designation of a demon that makes its attack like a storm, or comes with the storm.

²⁶ The sun god whose rays dissipate the shadows and the specters of the night—the favorite time for the activity of the demons.

various substances like onions, dates, palm clusters, bits of sheep's hide and goat skins and colored wool are introduced to be peeled or to be torn to pieces, and as each bit is thrown into the fire an incantation is recited. The rite is, again, purely symbolical. The incantation in the case of the onion is the following:

As this onion is peeled and thrown into the fire,
Consumed by the glowing fire-god,
Never to be planted again in a garden,
Never to be harrowed, never to take root,
Will never again be placed in the ground,
Its stalk will never grow, will never see the sun-
light again,
Will never come on the table of a god or king,
So may the ban, curse, pain and woe,
Sickness, groans, injury, sin, misdeed and trans-
gression,
So may the sickness in my body, in my flesh, in
my limbs,
As this peeled onion, be consumed by the glow-
ing fire-god.

The same incantation, with merely a change in the substance, is prescribed for the other materials when selected for burning.

Here there is no treatment prescribed for the patient. The burning of the image of the sorcerer or of the demon suggests as a further step the destruction of some substance, the burning of which is to symbolize the "destruction" of the demon as the cause and source of the suffering. Sins and transgressions are placed in the same category as bodily tortures, for sin shows itself in suffering. The advance signaled by this synonymy is along the line of primitive thought, but the new idea added is the punishment for wrongdoing by the entrance of a demon into the body of a victim. Sin is thus a form of uncleanness, and the sin can only be removed by exorcising the evil spirit which has secured its hold over the victim. The fire ritual thus forms a bridge leading to an entirely different province than the direct treatment of disease. Fire is not viewed as a purifying ele-

ment, contact with which removes uncleanness, but as a symbol of the hoped-for destruction of the demon as a means of ridding oneself from the clutches of the evil one.

IV

It is only in connection with the water-treatment that we pass on to genuine medical treatment. The *Asu*, or "water expert," passes over into the physician. He takes on this function because the use of water in the exorcising ritual is regarded as a purifying element, acting directly on the victim, whereas the use of fire, though at its start also viewed under the aspect of a purifying element, passes over into the domain of sympathetic magic and becomes associated with a symbolism that takes us outside of the sphere of medical treatment altogether.

Bearing this distinction between the water and fire incantations in mind, we will be prepared to find actual medical remedies introduced into the *Ea* ritual, supplemental to the sprinkling of the sacred element over the body of the victim. But while the *Asu*, from being merely an exorciser by the use of water, thus becomes the physician, the association of incantations with direct medical treatment is indissoluble in Babylonian-Assyrian medicine. The two aspects are never disassociated from each other, despite the considerable progress made in the course of time in the treatment of bodily ills. Both are essential to effect a cure—the medical prescription and the incantation—and as an interesting survival of this strange partnership, one may point to the custom reported by travelers which prevails among the fellahs of Egypt of swallowing not merely the drug prescribed by a native physician, but the prescription as well. The prescription takes the place of the ancient incantation; and it is perhaps not unnatural that even the modern prescription, with its queer cabalistic

signs so mysterious to the uninitiated, should be looked upon as a mystic formula. It is possibly also a fair inference that the swallowing of a prescription drawn up by a modern herb-doctor or quack—the direct heir of the ancient *Asu* or exorciser—is in many instances as effective as the taking of the drug.

Let me now turn to an illustration of the manner in which in Babylonian-Assyrian literature medicinal drugs are introduced in connection with incantation formulæ. In a tablet of the *Maklû* series—in which the water and fire rituals are combined—we find a long series of plants enumerated which are precisely the ones that are frequently encountered in medical texts proper. They are here enumerated with plays upon the name of the plants—genuine puns, but serving a most serious purpose. The hope is expressed by means of these plays that the plants may bind, pierce and lacerate the demons of disease, may cause them to scream, strike them blind, strangle them, and the like.

Like the *ninu* plant (i.e., ammi) may her enchantment²⁷ be weakened.²⁸

Like the *sapru* plant, may her enchantment cause her to scream.²⁹

Like the *sikblu* plant,³⁰ may her enchantment pierce her.³¹

Like the *sammu* plant, may her enchantment blind her.³²

Like the *kasû* plant (i.e., cassia), may her enchantment pierce her.³³

Like the *kbaltappanu* plant may her enchantment startle her.³⁴

Like the *kitmu* plant may her enchantment cover her.³⁵

²⁷ The reference is throughout to the enchantment of the victim through a witch.

²⁸ *Li-nu-shu* with a play upon *ninu*, the name of the plant.

²⁹ *Lisappiru* with a play upon *sapru*.

³⁰ A thorn plant.

³¹ *Liskbulu* with a play upon *sikblu*.

³² *Lisammu* with a play upon *sammu*.

³³ *Liksu* with play upon *kasû*.

³⁴ *Likbasbshu* with play upon *kbaltappanu* (for *kbastapanu*).

Like the *araru* plant may her enchantment curse her.³⁶

Like the *nukburtu* plant may it cut her lips.³⁷

The significant feature of such a list is the underlying idea that the medicinal plants are supposed to have their effect on the demon, here pictured as a witch who has cast a spell on her victim. The plants are supposed to have the power of destroying the vitality of the witch (or demon), to weaken her hold, to cause her discomfort, to torture her—all in the hope that the demon may be forced to make an exit out of the body of the sufferer. There is no sharp dividing line between the witch controlling the demon and the demon itself. The one is bound up with the other, and it is of the essence of ancient witchcraft that the witch is at one and the same time the demon and the controller of the demon, induced by her to enter the body of the victim.

Each plant is supposed to have some specific effect on the witch or demon. The name of the plant, in accordance with the significance attached to names³⁸ throughout antiquity as bound up with the essence of the thing designated by the name, becomes an omen. While we must not press such plays or names, as revealed by this text, too hard, yet the point of view is important for an appreciation of an essential feature of Babylonian-Assyrian medicine that the purpose of the medicinal drug is to have an effect on the demon, and only in this indirect manner to affect the patient. The patient is merely the accidental subject. The chief factor is the demon, and if the

³⁵ *Liktumu* with play upon *kitmu*.

³⁶ *Liruru* with play upon *araru*.

³⁷ *Litakbkira* (for *lintakbiru*) with play upon *nukburtu*.

³⁸ The name of an object is part of the essence of the object. To have a name is the synonym of "to exist." The meaning of the name, therefore, also involves the quality of an object. What we regard as a "play" on the name is for the ancients an indication of what the thing itself is.

Asu succeeds in driving the demon away, his part is fulfilled, no matter what happens to the patient, though the implication of course is that the patient is cured if the demon is driven out. If nevertheless the sick man, contrary to what he ought to do, dies, it is the equivalent to a "successful" operation in our days, to which the patient inconsiderately succumbs.

V

The transition from such an enumeration of medicinal plants, bound up with the exorcising formulæ, to actual prescriptions is a simple step. Accordingly, we find in a text in which the basis is an incantation in the name of Ea and his son Marduk, a genuine prescription, prescribed for a patient suffering with chills and fevers. It runs as follows:

Against fever and chills, which is not good for the flesh, fill a *sbukburratu* jar with water from a cistern, untouched by hand.³⁹ Add tamarisk wood, mashtakal-plant, shalalu-reed, ukkhuli (perhaps alkali), cummin, pressed date wine. Add thereto a sparkling ring. Pour the water over that man. Pluck *makkanu*-root, pour pure salt with pure *ukbbbulu* plant, and sweet oil brought from the mountain. Seven times rub the body of that man.

That the liniment is to be associated with the magic power of a ring is not to be regarded as an incidental factor, but inherent in the semi-magical treatment prescribed. The actual remedy, however, predominates. The rubbing of the patient with a liniment made of water mixed with oil, salt, cummin, some roots and other ingredients (the exact nature of which escapes us) is evidently intended to bring about a stimulation of the blood circulation, as a countereffect to the chills and fever pro-

duced by an irregular circulation. The introduction of the various ingredients rests, it may reasonably be supposed, upon actual experience, but the point of view, it is equally evident, is the hope that by manipulating the patient in the way indicated the demon of chills and fevers will be driven out of the body.

We have a large number of such texts in which medical prescriptions are closely entwined with incantations and also with purely magic rites. At times, the formulæ predominate and again the actual treatment; and according as this is the case, the text still falls within the category of incantations, or is to be regarded as a medical text, though the two aspects, as already indicated, are not sharply separated from each other.

For rheumatism, which is called "fever of the muscles and joints," we find in such a mixed text the following treatment prescribed:⁴⁰

- (1) Around water taken from the Euphrates, place in a circle flour made of putrid grain. Place within the circle *sbasbur*-reed. Take a measure of grain, place it on the *sbasbur*-reed and let the sick man sit on it.
- (2) Fill a *Ka* measure with the decayed grain and put it on the *sbasbur*-reed. Place the foot of the sick man on it, and cover the foot with putrid dough, made of the decayed grain.

Two remedies are here combined, the former of which has a more distinct touch of a magic rite in the direction to pour some holy water on the ground, or perhaps in a receptacle, and to surround it with a wall of putrid grain. The aim of the treatment is to drive the demon out of the body and to drown him in the water which is under the protection of Ea, and out of which he cannot escape by virtue of the wall around it. The reed placed in the water with a measure of grain is to form a

³⁹ That is, the water is to be drawn in a pail, without allowing one's hand to come into contact with the water.

⁴⁰ The text will be found in "Cuneiform Texts from Babylonian Tablets," etc., in the British Museum, xxiii, Plate i, 1-4.

kind of poultice to drive the demon out, by having the patient sit on it. In the second prescription the poultice is more definitely indicated, as is also the localization of the rheumatism in the foot.

What the modern layman would, therefore, describe as "drawing out the inflammation," the ancient *Asu* regarded as the endeavor to drive out the demon and then, if possible, to catch him, drown him or imprison him. This purpose of the treatment is even more explicitly indicated in the continuation of the text,⁴¹ where further directions are given how to catch the demon after having driven him out of the body.

Recite this incantation while covering the thigh. Place the putrid food in a room facing the west. Close up the door with earth taken from the *Pu*-plant, seal the door with *sbubu* and *gunu* stones. Then fasten a torch to the man's thigh, take hold of his hand and let him pass seven times and again seven times across the encircled water taken from the Euphrates. After he has crossed it, recite in a clear voice the incantation:

Ea has made, Ea has released.

Exorcise the evil, ease the pain (?).

Loosen the evil enchantment! Ea be with thee!

The heat of the torch is to act as an additional means of forcing the demon out as the patient crosses and recrosses the pool of water, which is under the protection of Ea. The room is to be tightly closed so as to preclude the possibility of the demon escaping through any opening. Ea is to catch him and put an end to him once for all.

VI

Now if Babylonian-Assyrian medicine had remained in this stage, it would have little interest for us except as a curiosity. We find, however, that though medicine in the Euphrates Valley never cut loose from the fundamental principle of exorcising the de-

mon, considerable progress was made in the remedies applied on the basis of actual experience.

By the side of incantation texts in which medical prescriptions are introduced—but viewed either entirely or mainly from the angle of magical rites—we have medical texts in the proper sense of the term, in which incantations play a subsidiary rôle and impress one as a survival, retained by virtue of the conservative instinct which preserves the old by the side of the new. The British Museum possesses in the great collection of tablets found by Layard in the ruins of the palace of King Ashurbanapal of Assyria (668–626 B.C.), about fifty years ago,⁴² a large number of medical texts dealing with various diseases and prescribing a large number of distinctly medical remedies. Of these texts—some four hundred—only a few have as yet been published.⁴³ Dr. R. C. Thompson has had ready for some time a large volume, embodying most of these texts, the publication of which has been delayed by the war. These texts are all copies made from the library which Ashurbanapal through his scribes had made from originals in the temple collections of Babylonian cities. The prominent part played by the *Asu*, or physician, in the Hammurawi code (*circa* 2086 B.C.), where the fees for the surgeon's operations are regulated and fines and punishments imposed for unsuccessful treatment, justifies us in carrying back these originals to the third millennium before this era.

A few years ago the Berlin Museum, according to published reports, acquired a collection of about one thousand medical tablets—presumably from Kaleb SHERGAT—the ancient capital of Assyria some forty

⁴² See Jastrow, "Civilization of Babylonia and Assyria," p. 21, *et seq.*

⁴³ By Friedrich KÜCHLER, "Beiträge zur Kenntniss der Assyrisch-Babylonischen Medizin," Leipzig, 1904.

⁴¹ *Op. cit.*, xxiii, Plate i, 9-14.

miles south of Nineveh. These too may turn out to be copies of older originals. A medical tablet of about the seventh century B.C. from Kaleb Shergat was obtained through a dealer by the College of Physicians of Philadelphia.⁴⁴ There are also two medical texts, one from the late Neo-Babylonian period, i.e., about the fifth century B.C., the other of the Hammurawi period c. 2000 B.C., in the Museum of the University of Pennsylvania.⁴⁵ There are also a considerable number of letters from Assyrian physicians of the seventh century B.C. included in the great corpus of "Assyrian and Babylonian Letters," edited by the late Robert Francis Harper,⁴⁶ which throw an interesting light on medical practice in Assyria. However, until the two large collections—the one in the British Museum and the other in the Berlin Museum—shall have been placed at the disposal of students, we must resign ourselves to a considerable amount of uncertainty as to the exact scope of medical knowledge and treatment in ancient Babylonia and Assyria. Yet the material published is sufficient to give us a bird's-eye view of the methods adopted in the treatment of disease and to show us the extent to which a genuine science of medicine, based on experience, developed, despite the very serious limitation, due to the persistence of the primitive theory of disease and to the confirmed combination of medical treatment with magic rites and the recital of incantations.

VII

The diseases most commonly referred to in the texts are stomach and intestinal troubles, liver complaints, fevers, colds, and eye diseases. The diagnosis is, as one

⁴⁴ Published by me, *Tr. College of Physicians*, 1913, pp. 365-400.

⁴⁵ They have been copied by Dr. H. F. Lutz and will ere long be published. The one of the Hammurawi period is particularly important as being the oldest medical text of Babylonia at present known to us.

might expect, the weakest feature, being purely empirical and devoid of any scientific principle. For purposes of treatment, the physicians prepared elaborate handbooks in which they entered very briefly the symptoms of the various diseases that had come under their notice, together with a variety of remedies to be used, given in the form of prescriptions. The number of such prescriptions for one and the same diagnosis varies. The aim evidently was to gather as many as possible, so that if one failed another might be tried, or it was left to the judgment of the *Asu* which one to use. Not infrequently as many as a dozen remedies are enumerated, with only occasional indications of the stage of the disease in which any particular one is to be used. The treatment being wholly empirical, the general procedure must have been for a physician to try one remedy after the other until the demon was exorcised, or until the patient succumbed to the remedies.

Let me quote a few examples. In a tablet dealing with stomach and intestinal troubles we read:

If a man's inside ⁴⁷ is sick, compound *shi-sbi* plant in wine at the rising of a star (i.e., in the evening). Let him drink it without food. Grind a stick of *Shi-Nub* plant, mix with finely powdered flour, stir with cassia juice, spread on a cloth and bind around his stomach and loins. If *ditto*, boil leak and *puttati* and let him drink it with milk. $\frac{1}{2}$ Ka ⁴⁸ of thorn, $\frac{1}{2}$ Ka of turnip, kneaded with milk, spread on a cloth and attach.

We have here two series of remedies, each one of which consists of a potion to ease the pain or cramp, and of an exterior application—a poultice. The first is a cold potion to be taken with wine, which is very

⁴⁶ Thirteen volumes (Luzac & Co., London, 1914). A bibliography of Babylonian-Assyrian medicine till 1902 will be found in von Oefele "Keilschriftmedizin" (Breslau, 1902), in "Abhandlungen zur Geschichte der Medizin," Heft iii.

⁴⁷ A general term, *libbu*, meaning "inner" (also "heart" as that which is "within") is used.

⁴⁸ A common measure.

frequently introduced as an ingredient, the second a hot one. The purpose of the poultice is apparently to produce heat, and thus by stimulating the circulation, to afford relief. The vagueness of the term used to diagnose the seat of the trouble makes it impossible to determine the nature of the disease, which may have been a simple case of indigestion.

Somewhat more specific is the description of a disordered stomach as follows:

If a man's inside is swollen and inflamed, and he is nauseated, then for his life (*i.e.* to cure him), mix onion with cumin seed, let him drink it in wine without food and he will recover. If *ditto*, take the green rind of the *Il* plant, mix with pig's fat, let him drink it with Du-Zab, unmixed wine and sweetened water, and he will recover.

Aggravated cases of inability to retain food are described as follows:

If a man has a pain inside, food and drink coming back to his mouth, bandage his head and breast. Boil . . .⁴⁹ let him eat it with honey, lamb fat and butter. Let him refrain from eating onions, white onions and *kidnu* for three days, and not wash himself with water and he will recover.

Here we have at last a diet prescribed. The honey, fat and butter are intended to soothe the irritation, while avoiding onions seems equally rational. Presumably, the direction not to wash for three days has reference to bathing, which should be avoided to prevent the patient from catching cold.

For a similar case of inability to retain food, pounded tamarisk seed is prescribed, likewise to be taken with honey and butter and without any other food.

For a case of constipation with gas in the stomach, a laxative mixture is ordered with very specific directions.

If a man's inside is full of gas, to cure him take sweet-smelling reed, *Balluku*-plant, cypress, oleander (?) . . . put into wine, boil, strain,

⁴⁹ Text defective.

let it cool, mix with oil and honey, let him drink it without food, and he will have a passage. The next morning, mix honey, fine oil, unmixed wine,⁵⁰ let him gulp it down without food and without touching his tongue, and he will have a passage.

In addition to poultices and drugs intended to mollify irritated membranes, to reduce swellings, to open the bowels, to get rid of wind, we come across such curious remedies as pouring concoctions over a patient's head, on his stomach and on his anus, though, presumably, in some cases rubbing of the affected parts with liniment is intended.

If a man has cramps,⁵¹ let that man sit down, with his feet under him, pour boiled . . . and cassia juice over his head and he will recover. If *ditto* let him kneel and pour cold water on his head.

The choice is here again between a warm and cold douche. If the one afforded no relief, the other could be tried. A variation of the treatment includes massage to stimulate circulation.

If *ditto*, place his head downwards and his feet [under him?], manipulate his back with the thumb, saying "be good," manipulate his arms 14 times, manipulate his head 14 times, rolling him on the ground. . . .

The address to "be good" appears to be directed to the demon, and in view of the underlying theory of disease, it would be a reasonable conclusion that the aim of the manipulation is to push the demon out of the body. If this be correct, we would have in such treatment another illustration of the manner in which the theory would accord with the result of experience. Massage must have been recognized as beneficial in certain cases, but the point of view necessarily was that what was good for the patient was bad for the demon. The drugs, the poultices, the hot and cold douches and the massage all were supposed to act not

⁵⁰ That is, strong fermented wine.

⁵¹ Literally "tying" or "contraction of the inside."

on the patient but on the demon, who was in this way to be forced out or to be coaxed out.

It is hard for us at the present stage of medical knowledge to reconstruct so strange and distorted an attitude towards the results of medical treatment, and yet it is perhaps fair to assume that the average lay person today when he hears of an anti-toxin to kill the germ that is the cause of a particular disease, has in mind a picture of something that by the treatment passes out of the body. At all events, the popular (not necessarily the scientific) notion of the "germ" theory should help us to understand the point of view which looked upon any relief from pain as due to an influence exercised upon the demon. The removal of an irritation was always realistically interpreted as a consequence of getting the demon away from the affected spot. The drug was supposed to be disagreeable or harmful to the demon and, similarly, the poultice—hot or cold—was unpleasant to him, and the bandage around the head or breast or stomach was supposed to strangle him.

The use of an enema, which is frequently referred to in the medical texts, would strengthen the belief that a cure actually involved driving the demon out of the body. Prescriptions of this character read as follows:

If a man has a stomach ache, he cannot retain food which comes back through his mouth, his . . . is pierced and he has diarrhoea, his flesh is flabby (?), and wind (i.e., gas) moves about in his anus . . . to cure him take $\frac{1}{2}$ Ka of date juice, $\frac{1}{2}$ Ka cassia juice, oil and sweetened water, 3 shekels⁶² of clarified oil, 2 shekels of honey, 10 shekels of pounded mint added thereto, at night before the rise of the

goat star⁶³ and in the morning without food let him drink. Then let him take $\frac{1}{2}$ of Shi-Ka through his mouth and anus, sprinkle him with it and he will recover. If *ditto*, mix rock salt⁶⁴ and ammoniac⁶⁵ with unmixed wine, let him take it without food through his mouth and his anus, sprinkle him with it and he will recover.

Or again:

If a man has cramps, compound green onions, chicory rind with unmixed wine and let him drink it without food. (For his diet) let him eat dates either in pig's fat or in oil . . . If *ditto*, take Shi-Shi plant, Shi-Makh, tarmush (a kind of bean), root of male namtar (some bitter root), moistened with unmixed wine at the rise of the star (i.e., in the evening) and in the morning, let him drink one-third of it without food, and two-thirds let him direct into his anus, and he will recover.

As the last example of a disordered stomach I quote a most realistic description of what we would call a case of "jag," but which the Babylonian Asu sets forth in most serious fashion:

If a man has drunk unmixed wine and has a severe headache, he forgets his words,⁶⁶ his speech is heavy, his mind is clouded, his eyes are set, take (eleven plants are enumerated) mix them with oil and wine, let him drink before the approach of Gula,⁶⁷ and in the morning before any one has kissed him.

Did the Asu add the last touch from a sense of humor?

Now taking all these and other descriptions with the prescribed remedies together, we obtain not only an extensive pharmacopœia but also a rather large variety of treatment as well as dietary precautions, bandages, poultices, douches, massage, enemas and even indications of a rest cure.

term *sal ammoniac* is directly derived. Amanus is the name of a mountain range in northern Syria. The common derivation from the temple of Amon in Egypt is erroneous, and rests upon a phonetic coincidence. The substance appears to have been introduced into Egypt through Babylonian influences.

⁶² That is, does not know what he is talking about.

⁶³ Another expression meaning "evening."

⁶² A standard silver coin, worth about 40 cents, but here used as a weight.

⁶³ A general phrase equivalent to "evening."

⁶⁴ Literally, "mountain salt."

⁶⁵ Literally, "salt of Amanus" from which our

VIII

When we turn to other diseases, the list of drugs and the methods of treatment can be still further extended. Liver troubles are particularly frequent in hot moist regions like the Euphrates Valley, and our medical texts give many specimens both of diagnosis and treatment. A clear case of a disordered liver is described as follows with an interesting emphasis on the character of the excrements:

When a man has sharp pains in his head, gall⁵⁸ is mixed with his excrements, his bowels are disordered, he cannot retain onions, leek, beef, pig's meat and unmixed wine, for his cure take (prescription of some 20 plants) with oil and flour, strain it, stir with wine, spread on a cloth, attach it for three days and remove it on the fourth day. If his excrements are white, he is improving, if red the fever⁵⁹ is still there, if green, he will shortly die (?) . . . if black, he will grow worse and die; he will not recover. If (the excrements) are long, take dough and *kurbannu* of the field, mixed and pounded with mud . . . knead with cassia juice and let him drink it with wine. After he has drunk it, let him wash himself with *sbunu*-juice, Ag-ut and Dilbat plants.

The general aim of the treatment in gall troubles appears to have been to superinduce a free movement of the bowels.

If a man is seized⁶⁰ with gall trouble, pound cassia, let him drink it with unmixed wine and he will have a passage.

Among other remedies prescribed to move the bowels are drinking salt water, or salt with wine, or onions in water. For jaundice designated as "yellow" sickness⁶¹ we have

⁵⁸ The Babylonian term *marru* means "bitter."

⁵⁹ Literally "fire."

⁶⁰ The verb used is interesting as an indication that a demon has got hold of him. Our modern usage of the term to be "seized" with a sickness is a survival of this view.

⁶¹ *amurrikanu*.

⁶² The term used *lisban kalbi*, "dog's tongue," is the source of our *cynoglosson*—a direct derivative,

a large number of remedies. The diagnosis is simple up to the point of naïveté.

If a man's body is yellow, his countenance is yellow, the flesh swollen (?)—that is *amurrikanu* (i.e., yellow disease).

Among the remedies prescribed are drinking a mixture of cypress with wine, crushed myrrh or cynoglosson⁶² or chicory⁶³ or the same ingredients (and other drugs) taken with milk.

A more detailed description of jaundice in an advanced stage reads:

If a man has yellowness of the eye, the disease having extended to the eye, so that the water of the eye is green as copper . . . his inside is swollen, he cannot retain food or drink and the sickness has dried up his entire body—that man will die.

Or again most graphically:

If a man has yellowness of the eye, his head, his face, his whole body even to the root of his tongue is affected, it is fatal (?)⁶⁴. He will die.

A distinction is made between the disease which gives the face a yellowish appearance and when the skin becomes dark, in which case it is called *akbkazu*, i.e., "seized" from the name of the demon,⁶⁵ regarded as the cause of the disease.

If a man's body is yellow and his face is yellow and black, the root of his tongue is black—that is *akbkazu*. Bake large Mush-Dimguruna⁶⁶ of the field, let him drink it with wine and the *akbkazu* will be quieted.⁶⁷

As in the case of jaundice, also cypress, myrrh or chicory is prescribed to be taken in wine or milk, as well as a paste made of powdered mountain-stone, mixed with oil and wine.

The term used for "colds" is used as therefore, like cassia, from Babylonian medicine.

⁶³ *Kukru*, the origin of our "chicory."

⁶⁴ Or perhaps "incurable."

⁶⁵ See above, p. 235.

⁶⁶ The name of a basilisk, but here presumably the designation of a plant.

⁶⁷ The verb again rests on the picture of the demon who is subdued through the treatment.

vaguely as the modern one is in general parlance. A tablet, dealing in detail with such troubles, begins:

If a man has a cold which has developed pains in his stomach, let him compound namtar root and liquorice root and beans (?) and darnel, Shi-Man, Tu-me and "tongue" plant—these seven drugs with wine let him drink as the star rises (i.e., in the evening) and in the morning, and he will recover.

As a last example from the medical texts, I choose some remedies prescribed for fever, appropriately called "fire,"⁶⁸ taken from a tablet which is particularly interesting, because it once formed part of a library belonging to a physician whose name was Nabu-zer-kitti-lishir,⁶⁹ the son of Mardi, grandson of Aplâ. The tablet dates from the late Assyrian period—somewhere in the seventh century B.C., and represents an extract from a larger series of medical texts, prepared by the physician for his own guidance and use. It is the only specimen so far published of a physician's handbook.⁷⁰

If a fever seizes a man, localized in the nerves of his head (i.e., produces a severe headache), and it affects his eyes so that his vision is clouded,⁷¹ and inflammation sets in, and his eyes water, pound one-third Ka of powdered "thorn" root with *kbalappanu* stone, take one-third of it for the head that pains, knead with cassia juice, wrap it around the head, attach it (i.e., by a bandage), and for three days do not remove.

The physician includes in his extracts other remedies for headaches which are not accompanied by a fever:

⁶⁸ In the Talmud the question is asked, "what is fever," to which the answer is, "a fire of the bones."

⁶⁹ The name signifies "O, Nabu, may the legitimate offspring flourish."

⁷⁰ The one referred to above, p. 240, in the possession of the College of Physicians of Philadelphia. For a complete translation and discussion of its contents, see my article, *Tr. College of Physicians*, 1913, pp. 365-400.

If a man's head burns, his head oppresses him, particularly the veins of his temple, compound . . . with oil, wrap it around his head, press it on tight and do not remove for three days.

A poultice of a more complicated character to be used as a compress consists of:

$\frac{1}{2}$ Ka of powdered juniper wood, 10 shekels of powdered cypress, 10 shekels of cypress, 10 shekels of chicory, 10 shekels of powdered cassia, 10 shekels of large Tig flour, $10\frac{1}{2}$ shekels of small Tig flour, 10 shekels of good standing wine, 10 shekels of powdered radish, mix them together, knead with wine into a solid paste, strain, take one-third for his head which pains, mix with cassia juice, wrap it around and for three days do not remove.

He also prescribes an eye wash of alkali with which, it is directed, his eyes are to be washed until the tears cease to flow. Then the eyes are to be bandaged, and the patient to be put into a closed room, and the patient's head is to be rubbed with boiled juice of *kiptu* every evening and morning, alternating with poultices of various ingredients and oil liniment—the treatment to continue as usual for three days.

Our physician, despite the late period in which he flourishes, holds to the belief in demons as strongly as do his patients, and so he does not hesitate to copy on his tablet the following purely magic rite to drive the demon out in case all other methods fail.

If a man's head is affected and the demon⁷² in the man cries out,⁷³ but comes not out, is not caught by bandage or incantation, then kill a captured *kurku* bird, squeeze its blood out,⁷⁴

⁷¹ A blinding headache.

⁷² There is a special demon of headache, who is known as *Ti'u*.

⁷³ One is reminded of the passage in Mark 1, 26 = Luke 14, 33, of the unclean spirit (i.e., demon) in a man that cries out and issues from the body at the command of Jesus. See also the incident in Luke 9, 27.

⁷⁴ Note a similar rite of using the blood of a bird as part of the rite to exorcise the demon of *sara' atb*, a skin disease (not our leprosy) in Leviticus, Chap. 13, for the explanation of which consult the

take its . . . its fat and the skin of its crop (?), burn it in the fire, mix cedar with the blood, and pronounce the incantation "evil finger of man" three times.

These examples will suffice as illustrations of the general character of the medical texts of the Babylonians and Assyrians, showing both the method followed and the decided limitations in this method. Medical treatment, being based solely on popular experience, never reached even to the borderland of a science. It developed no new theory of disease; on the contrary, it clung to the old one. The *Asu* was as steeped in superstitious regard for the value of incantations and magic rites as his patient. Both stood on the same platform, and the manner in which, even in genuine medical texts, incantations and magic rites are prescribed shows the persistence of the primitive theory, and the impossibility of any genuine advance in medical science beyond prescribed bounds. We not infrequently find the incantations to be recited taking up more space than the remedies prescribed. Even such trifles as that a medical potion should be held in the left hand while drinking it seemed worthy of mention. The incantations—a jumble of phrases, often meaningless—are set forth in detail.

Wind of the glowing, wind, wind close to the gods

Wind that went forth between excrements and urine,

And whose throne is set up with the gods, thy brothers.

This incantation for one suffering from an inflated stomach is to be recited, while the patient is being rubbed with a salve of cynoglosson and oil.

Or in another instance the incantation reads:

writer's article, "The So-called Leprosy Laws," in the *Jewish Quarterly Review*, New Series, vol. iv, 1913, pp. 336 *et seq.*

⁷⁶ Play upon *libbu* "heart" and the "insides."

The "heart" plant grew in the mountain and I tore it out—the "inside"⁷⁶ became affected—The god Sin⁷⁶ [plucked it out].

I commanded, and the "heart" of Shamash⁷⁷ was affected; Shamash [plucked it out]

I commanded, and the "heart" of heaven and earth became affected.

And so on *ad infinitum et ad nauseam*. Such incantations may well represent older elements than the prescriptions proper, but their retention in that case by the side of genuine remedies is as significant a feature as their greater age.

IX

Turning now to the pharmacopœia of the Babylonians and Assyrians, the large dimensions that it assumed in the course of time will have become apparent from the examples quoted. This conclusion is confirmed by the long lists of plants that have come down to us in the later copies of Ashurbanapal's library,⁷⁸ and also in texts dating from much earlier periods. These lists were prepared in the temple schools of Babylonia where all instruction was imparted, including, therefore, the training of priests to act as physicians. The evident aim was to make these texts as inclusive as possible so as to cover all the plants and woods and shrubs that grew in fields, gardens, orchards and in the mountains. The medical character of these lists is indicated by the use of the determinative *Sham*, signifying "drug," and which, like *Asu*, has made its way from the Sumerian into the Semitic languages. Moreover, in addition to the names, the lists often contain indications of the use to which the drugs are to be put, or in what way they are to be compounded with other drugs or with ingredients other than drugs. Finally, we have the proof for the medical character of these lists in the circumstance

⁷⁶ The moon god.

⁷⁷ The sun god.

⁷⁸ Many specimens of such lists in "Cuneiform Texts," Part xiv.

that many of the "plants" mentioned are precisely the drugs occurring in the medical texts. No doubt when the two large collections of medical texts in London and Berlin, which have been above referred to,⁷⁹ shall have been published, we will find that most if not all the plants, trees, and shrubs, of the extensive lists served some purpose in medical treatment.

A rough estimate shows that the ingredients used in medical prescriptions mounted high in the hundreds.

The lists also reveal attempts at a classification of plants, thorny plants being placed together in one group, a series of shrubs in another, plants of which the roots are used in a third, and so on. The classification is of course not based on any scientific principle but, in agreement with the purely empirical character of Babylonian-Assyrian medicine, suggested by external features. So we have lists grouping various kinds of Ammi plants (*ninû*), of cynoglosson, of juicy and sweet-smelling plants together. Again, drugs are placed together which are to be used in the case of the same disease. So, for example, we have a list of six plants or drugs that are to be used for diseases of the teeth and to be placed in the mouth, and again a series to be used for compresses around the head or for poultices to be placed on the stomach or the anus, or as ingredients for enemas. In other cases, drugs are enumerated to be used for dog or serpent bites.

Indications are added in other cases of the manner in which the drugs are to be taken, mixed with oil or taken in wine and the like.

Unfortunately only a small proportion of the drugs have up to the present been iden-

tified. The difficulties involved in such identifications are very great. In the first place the plants often have fanciful names, and unless we are able to determine the character of these names, we reach an *impasse*. It seems hopeless to solve such a puzzle as is involved in a name like "plant of tears" from the fancied resemblance of some part of the plant to tears. A "star" plant is evidently suggested by the shape, but what is it? A name like "sword" plant tells us that the plant has a sharp cutting edge, but the term again is too general to admit of a definite identification. If we knew the folklore of ancient Babylonia we might be sure of an identification for the "birth" plant. As it is we are confined to a guess that it may be a species of "mandrake," associated so commonly with sexual fertility. In quite a number of cases, we have the comparison with plant names in other Semitic languages—notably the Aramaic—to help us,⁸⁰ and sometimes the signs with which the plants are written furnish a means of identification. A study of the flora of the Euphrates Valley and Mesopotamia in general with the present names in use by the natives, many of which reflect popular points of view, will probably yield important results, for traditional lore has a way of clinging to the soil that is often surprising.

Summing up the results so far gleaned from these various sources, we have quite a number of the ingredients used in Babylonian-Assyrian medicine that may be identified with certainty. Among these are (as already indicated) *kasû*, from which our own "cassia" is directly derived; *lisban kalbi*, "cynoglosson"; *shilim*, "darnel"; *ninû*, "fennel"; *kurkanu*, "crocus" (or saffron), which appears likewise to revert to the Babylonian term, *kukru*, identical with our

⁷⁹ See p. 239.

⁸⁰ The splendid work of Löw, "Aramäische Pflanzennamen," Leipzig, 1881, has been of great service in this respect. Recently, a young Finnish Assyriologist, Harri Holma, has made a valuable

contribution to the identification of Babylonian plants and drugs, embodied in his "Kleine Beiträge zum Assyrischen Lexikon," Leipzig, 1912, pp. 57-94. See also some suggestions in Stucken, "Asstralmythen," I, p. 5, note.

"chicory" (*cichorium*); *sbushi*, "liquorice root"; *karasbu*, "leak"; *gingiru*, "rocket" (*eruca sativa*); *tarmush*, a "bean" of some kind; *girgishsbu*, "strawberry tree" (*arbutus unedo*)—native in Mesopotamia and Palestine; *silbanu*, "liquorice wood"; *burasbu*, "cypress"; *laptu*, "turnip" (*brassica rapa*); *puglu*, "radish"; *zuziratu*, "portulac"; *sapru*, "straw flower" (*belichrysum*); *lardu*, identical with "nard" (by a common interchange between l and n); *sapandu*, which has passed over into Persia and Arabia as *sipandu*, and is our white mustard (*sinapis alba*); *kulkulanu*, "cassia-tora"; *kaman*, identical with our "cinnamon"; *kamtu*, "truffle"; *kbazilatū*, "colocynth"; *sagilatu*, "jasmin"; *sbisbbanu*, "vitex agnus castis"; *kbarubu*, "St. John's wort." The terms for "coriander" and "caraway seed" seem also to have been determined with considerable certainty.

Among trees of which the leaves, bark, sap, roots and seeds were used for medical purposes we have *urbatu*, "willow"; *binu*, "tamarisk"; *tiṭtu*, "fig"; *asu*, "myrtle"; *sarpatu*, "elm"; as well as the terms for olive and cypress. Among salts, we have at least two which are quite certain "mountain salt" which is our rock salt, and "salt of amarus" which, as pointed out,⁸¹ is our ammoniac. Other mineral substances, crushed and compounded, were used in considerable number, and it should be noted that just as in medical texts and in lists, the sign for "plant," *Sham*, is used in a general way for all *organic* substances, so the sign for stone (Sumerian *Na* = Akkadian *abnu*) is used in general fashion for *inorganic* substances.

Before leaving the subject, attention should be directed to a feature of the lists of plants and drugs drawn up by the scribes for medical instruction and guidance. We find a large number of substances enumerated that are conspicuous for their nasty

and ill-smelling qualities. These drugs constitute a *Dreckapotbeke*, to use the expressive title for a general compilation of such strange remedies⁸² and which, as is well known, were in general use in all countries until well into the nineteenth century, and no doubt still survive as "lay" prescriptions—"housewife remedies"—in many a nook and corner of Europe. In the Babylonian-Assyrian *Dreckapotbeke*, we encounter such examples as a "green frog" to be mixed with chicory, the claw of a black dog with "pestilence" root, the dust from a man's foot to be added to powdered "thorn" plant. Pig's fat, dog's dung, fat of a viper, neck of a dog, the excrements of man and swine, the hair taken from a virgin goat, a hair from the *pubenda* of an old woman, and much more of the like are included in the lists.

Such remedies represent, as I venture to suggest, a natural outcome of the primitive theory of disease upon which Babylonian-Assyrian medicine rests. Their purpose is to have a direct effect on the demon by disgusting him through their nasty smell—to lead him to fly to regions where the air is more agreeable, and thus to relieve the unfortunate victim after being obliged to submit to an ordeal that must often have seemed worse than the disease. The *genuine* remedies represent, of course, the result of experience, but it was easy to apply the fundamental principle—that what was good for the patient was bad for the demon—to remedies that were intended to bear on the demons, without reference to any medicinal character of the substances employed.

When with the advance of medical knowledge of a more rational kind the value of genuine remedies acting on the patient increased, the value of the *Dreckapotbeke* was forced into the background, without, however, altogether disappearing. The nasty

⁸¹ See above, p. 242.

⁸² K. F. Paullini: "Heilsame Dreckapotheke," 1714 (reprinted, Stuttgart, 1847).

substances acquired the power of a *charm*, and from this point of view the old Babylonian-Assyrian *Dreckapotbeke* was carried along the ages, gathering new ingredients on the way and surviving to the threshold of modern times. The substances which the witches in "Macbeth" throw into the cauldron⁸³ to produce a charm to enable them to peer into the future bear a close family resemblance to the ingredients of the "magic" aspect of Babylonian-Assyrian medicine that is hardly accidental. The usage in both instances rests ultimately on the same association of ideas, though the purpose differs.

Fillet of a fenny snake
In the cauldron boil and bake
Eye of newt and toe of frog,
Nose of bat and tongue of dog,
Adder's fork and blind-worm's sting,
Lizard's leg and owlet's wing,
For a charm of powerful trouble,
Like a hell-broth boil and bubble.

The substances represent drugs that continued to form part of the popular, as also part of the professional pharmacopœia in Shakespeare's days and beyond. The charm passes over into the amulet, and the wearing of bits of animals or trinkets in the shape of substances supposed to have magical power is merely another expression of the same idea that such substances as

Scale of dragon, tooth of wolf
Witches' mummy, maw and gulf
Of the ravin'd salt-sea shark,
Root of hemlock, digg'd i' the dark⁸⁴
Liver of blaspheming Jew,
Gall of goat and slips of yew,
Sliver'd in the moon's eclipse,
Nose of Turk and Tartars lips,
Finger of birth-strangled babe,
Ditch-delivered by a drab.

⁸³ Act iv, i, lines 14-40.

⁸⁴ The direction not to pluck a medicinal root while the sun shines is specifically given in the Babylonian-Assyrian lists of medicinal drugs; e.g., "Cuneiform Texts, from Babylonian Tablets," xiv, Plate 25 (K 259).

are supposed to have the power of disgusting the demons and of driving them away.

Lastly, we have included in the lists, compiled by the Babylonian-Assyrian scribes for use in the medical courses given in the temples, actual prescriptions, the form of which is very simple. The drugs to be compounded are enumerated, together with the indication of the disease against which they are to be used. In this way,⁸⁵ we have nine drugs set forth, as a remedy for stomach trouble, five drugs to be compounded for the advanced stage of jaundice—known as *akbkazu*,⁸⁶ a formula of six drugs for the ordinary form of jaundice, and so on.

X

A direct natural result of medical treatment among the Babylonians and Assyrians was to lead to the study of the human body and to some extent also of animal anatomy. An elaborate anatomical nomenclature was evolved which, passing far beyond the obvious subdivisions of the body to minute details, furnishes the evidence that the general structure of the human body was actually studied by the medical students of the Euphrates Valley thousands of years ago. Long lists of parts of the body were drawn up by the scribes which show the richness of the anatomical nomenclature developed in the endeavor to subdivide the organs and members of the body into their component parts.⁸⁷ Let me take as an illustration the designations of the parts of the male and female genital organs. A common term for both is *ba'ultu* which has the force of "pudenda." The most frequent term for the penis is *birku*, literally "knee,"

⁸⁵ "Cuneiform Texts," xiv, Plate 48 (Rm 328).

⁸⁶ See above, p. 243.

⁸⁷ The most comprehensive study of the subject is embodied in the monograph by Harri Holma, "Die Namen der Körperteile im Assyrisch-Babylonischen," Helsingfors, 1911, in *Annales Acad. Scientiarum Fennicae*. Ser. B, Tome, vii, i.

and which suggests that *birku* is a euphemism just as we find in other languages some part of the body suggesting the penis as "hand," "foot," "leg," "tail" used euphemistically for the male organ. The "testicles" are *isbku*, the "foreskin" *urulâti*, and the "prostate gland" perhaps *sapsapu*. For the female organ, the number of terms is very large—so large indeed as to suggest that specific parts of the womb were intended—though each term was used also for the female organ in general. We find among others *uru* from a stem indicating "nakedness," *bissûru*, perhaps the "clitoris," *rubûu*, the "uterus," *rêmu* or *rêmtu* the "womb," *kuzbu*, perhaps the "mons veneris," *libisbshatu*, probably the "hymen," *silitu*, "after-birth," and such fanciful names as *E-tur*, "house of the child," and *pirisbtu*, "secret,"⁸⁸ besides a number of more definitely euphemistic terms.

It is entirely natural and not indicative of technical knowledge to find in such lists terms for leg (*isbdu* literally "pillar" or "support"), knee (*birku*), flank (*kurîtu*), shin-bone (*kimûu*), leg (*puridu*, literally "advance"), foot (*shêpu*), sole (*bûd shêpi*), heel (*ikbu*), toe (*ubânu*) and nail (*ûpru*), or that for the upper part of the body we should have names—and in some cases several names—for the eye, ear, lip, nose, nostrils, mouth, teeth, gums, tongue, throat, beard, breast, nipple, etc.; but when we find in the case of the eye such subdivisions as iris (*burmu*—literally "many colored"), eyelid (*kappu*, "wing"), *nakabtu*, "corner of the eye," eye-ball (*gaggultu*), pupil (*libbu*, "inside"), *arku*, "white of the eye," *şalmu*, "dark of eye," or when in connection with the throat and neck, the differentiation extends from *kishadu*, "neck," to *labanu*, "nape," *tikku*, "back of neck," *napisbtu*,

"jugular vein," *girru*, *girânu*, and *gangu-ritu*, "gurgle," with further subdivisions, *kbarurtu*, "larynx," *ur'udu*, "windpipe," *khamuritu* perhaps "vocal chords," and subdivisions of the back into "spinal column" (*esensiru*—literally, "bone of the back"), shoulder (*bûdu*), shoulder blade (*rapasbtu*), and various other terms, and similarly for the stomach (*karsbu*), such divisions as *takaltu*, "stomach net," *pappan libbi*, "navel," *butnu* "belly" (?), we may reasonably conclude that medical practice superinduced such detailed analysis. We have in all about four hundred terms for the various organs and members and subdivisions of the human body. This extensive nomenclature, which will no doubt be further increased as new texts are made accessible, is a significant testimony to the attention that must have been paid to the study of anatomy, though to be sure, in a purely empirical and unscientific fashion.

We may go a step further in tracing the origin of this study which, curiously enough, takes its start not with medicine but with divination; and, what is still stranger, it was the attention paid in the interest of divinatory lore to the liver of the sheep, the sacrificial animal *par excellence*, that furnished the stimulus to the study of anatomy.

Among the various methods of divination developed by the Babylonians and Assyrians, the endeavor to read the future in a sheep's liver appears to be the oldest, as it is certainly the most widespread of primitive methods to ascertain the disposition of the gods at any critical juncture in affairs. In various publications I have enlarged upon this subject of liver divination, or hepatoscopy,⁸⁹ and of its spread under Babylonian-Assyrian influence, so that I may content myself here with a brief ref-

⁸⁸ One might compare our use of "privates."

⁸⁹ See my monograph, "Babylonian-Assyrian Birth Omens and Their Cultural Significance," Giessen 1914, p. 1, where a list of articles of mine on the

subject is given; and for a general survey of the field of Babylonian-Assyrian divination, see Jastrow, "Civilization of Babylonia and Assyria," pp. 254-269.

erence. The method rests upon the belief that the liver as the bloodiest organ in the body was also the seat of life. The association of ideas between blood and life was as natural as it was obvious. Early speculations about what we in common parlance call the soul or the vital essence always take on a materialistic turn. Life was looked upon not as a condition, but as connected with some *substance* and, accordingly, the attempt was made to localize the seat of life in some part of the body. Blood being regarded as identical with life, the organ which seemed to be the center and seat of the blood, whence it was distributed throughout the frame, was also the seat of life. The primitive observation was correct to this extent—that the liver contains a considerable proportion of the blood of the body, about one-sixth in the case of many animals, and even more than this in the case of man.

The ordinary sacrificial animal in Babylonia and Assyria was the sheep, and in order to ascertain the disposition of a deity at any given moment, a sheep was killed and its liver examined. According to symptoms found on the liver conclusions were drawn as to whether the signs observed portended a favorable answer to a question put, or whether one had better defer an undertaking till a more favorable moment. The sacrificial animal offered to a deity and accepted by him became attuned, as it were, to the deity. The soul of the animal

and the soul of the god became for the time being in perfect accord. The liver as the soul of the animal reflected the disposition of the deity as in a mirror. If one could read the signs on the liver, one could be certain of what the god had in mind—whether he was favorably disposed to the questioner or unfavorably minded—just as in the higher form of astronomical divination, the reading of the stars revealed the frame of mind of the gods in heaven.

This curious method of liver inspection had, however, the result of leading to a study of the sheep's liver, for in the course of time as the signs noted on examined livers increased—and no two livers were ever exactly alike—liver divination became a pseudoscience for which specialists had to be trained.

The experience of the past was gathered in handbooks which formed the textbooks for training the priestly augurs—the precursors of our modern meat inspectors. By means of a natural or artificially developed association of ideas between signs observed on the liver and what they portended, and further on the basis of actual experience that on an occasion when an inspected liver showed certain signs, an event of a favorable or unfavorable character occurred, an elaborate system of liver interpretation was built up that continued in force till the end of the Babylonian empire and spread to other lands.⁹⁰

⁹⁰ The general principle underlying the system was the significance attached to any deviation from the normal—an abnormally large or abnormally small lobe, a peculiar form of the *appendix pyramidalis* or of the *appendix capillaris*, an unusually large or thick or unusually short or thin gall-bladder, the shape of the hepatic duct and the like. The interpretation varied according as the abnormality appeared on the right or on the left side of any part of the liver. In general, a sign on the right side portended something favorable, on the left side something unfavorable. If favorable to you, the

sign was a bad one for the enemy, if unfavorable to you then it was favorable to the enemy. To the markings on the liver—due to the traces of the subsidiary ducts on the surface—great attention was paid, and all kinds of fanciful objects were seen in the combination of these markings. The general principle was always subject to modification through the observation that on a former occasion certain signs were followed by certain occurrences, favorable or unfavorable. The ramifications of the system of interpretation that thus grew up were nigh endless, just as the field of divination in astrology and in birth omens was boundless.

The study thus given to signs on the liver included the appearance of the gall, of the various lobes of the gall-bladder and of the gall-ducts, of the larger and smaller appendices to the liver and of the veins. Names for these subdivisions were devised, some of which passed over into the anatomical nomenclature of other lands or which influenced that nomenclature. Since this curious system of hepatoscopy was devised as early at least as 2500 B. C., we may safely assume that the inspection of the sheep's liver marks the very *beginnings* of the study of animal anatomy anywhere. The impetus thus given by liver divination reacted on the natural curiosity of man, and was no doubt a factor in leading to a closer observation of the human body as part of the medical training of the Babylonian-Assyrian *Asu*, with the result of producing the very extensive anatomical nomenclature that forms one of the surprises in the study of cuneiform literature. The proof that this study was undertaken in connection with the endeavor to drive out the demons of disease by incantations and medical treatment is again furnished through the occurrence of the anatomical nomenclature in incantation and medical texts, as well as in divination texts that form a supplement to incantations and medical prescriptions.

XI

By way of further illustration of the use of anatomical terms in Babylonian-Assyrian medicine, supplemental to the occurrence of these terms in the specimens from the

medical texts already given, let me quote some passages from letters from Assyrian physicians that have come down to us. These letters form part of the royal library at Nineveh which has been mentioned.⁹¹ Incidentally, they also shed a further light on medical diagnosis and medical treatment in ancient Assyria.

One of these letters written by a court physician, Arad-Nanâ, in the days of King Ashurbanapal (668-626 B. C.) deals with the case of one of the royal princes who is suffering from an injury to the eye. The physician reports to the king as follows:

To the King, my lord: thy servant Arad-Nanâ! Hearty greetings to the King my lord! May Ninib and Gula⁹² grant happiness and health to the King, my lord.

Hearty greetings to the little fellow whose eyes cause him trouble. I put a bandage⁹³ on his face. Yesterday, towards evening, I took the bandage off, removing also the dressing below. There was blood on the dressing as much as the point of the little finger. To which one of the gods this is due, his order has surely been carried out. Hearty greetings! Let the King, my lord, rest assured. In seven or eight days he will be well.

The nature of the injury, unfortunately, is not stated, nor the ingredients in the dressing. The injury—perhaps a wound—had resulted in hemorrhages and the doctor reports that the eye was almost healed. The flow of blood had almost stopped. In accordance with the pious belief of the day, the physician ascribes the improvement to the gods, though he does not know which one of them has come to the rescue.

Assyrian and Babylonian letters, though not infrequently others are added. So in Assyrian letters one finds Ashur and his consort, Belit, or Nebo and his consort, Nanâ, invoked. In the subscripts to the literary collection of Ashurbanapal the divine pair Nebo (the god of wisdom and writing) and his consort, Tashmitu, are introduced, except in the case of divination and omen texts which substitute Shamash and Adad.

⁹³ No doubt a dressing with a salve.

⁹¹ See above, p. 240.

⁹² Letters almost invariably begin with a greeting of this kind in the name of some god or some gods. In the case of medical letters, Ninib, who is the god of healing, and his consort, Gula, are always invoked; in the case of divination and omen texts, Shamash (the sun-god) and Adad (the storm-god) who are the gods of divination are addressed. Otherwise, the ordinary greeting introduces Nebo and Marduk in

If the "son of the king" mentioned in another letter of Arad-Nanâ is the same prince, it would appear that the young fellow was also suffering from hemorrhages of the nose. Arad-Nanâ reports, after the customary greeting, that the treatment prescribed by some one else to stop the bleeding was not correct, and proposes a different one:

In regard to the bleeding of his nose (i.e., of the prince) about which the Rab-Mugi (a high official) has reported to me that yesterday towards evening there was much bleeding, these dressings are not properly applied. They have been placed on the *alae* of the nose, obstructing the breathing, while at the same time the blood flows down into the mouth. Let the nose be plugged up at the back, so that air will be held out, and the bleeding will cease. If it please the king, I will come to look at it to-morrow. Meanwhile may I hear good news.

A third letter of this same physician deals with an aggravated case of rheumatic fever from which the king is suffering. The royal patient has grown restive, and in human fashion places the blame for the failure of the remedies prescribed on the doctor. He raises the question whether the latter understands the case, and the doctor confesses that perhaps the treatment was not right.

The King, my lord, continues to declare, "the state of this sickness of mine thou dost not recognize, thou dost not bring about a cure." Now, I confess that hitherto I did not understand this rheumatism,⁹⁴ but now I seal this letter and send it to the King, my lord. Let it be read to the King and properly understood. When it reaches the King, my lord, let a physician . . . carry out the accompanying directions. Let the King apply this liniment. If the King does this, this fever will soon leave the

King, my lord. A second and a third time this oil liniment should be applied to the King, my lord. Let the King see to this. If it please the King, let it be done in the morning. This disease is in the blood. Let them bring the King a *sil-banu*⁹⁵ as was twice done, and let it be vigorously applied. I shall come to inform myself and as soon as the perspiration flows freely from the King, my lord, I will send to the King something to apply to the King's neck. With a salve which I shall send to the King, my lord, let the King, my lord, be rubbed at the appointed time.

XII

In conclusion, let me summarize the references to the Asu in the famous Ham-murawi⁹⁶ Code, promulgated c. 2080 B. C., toward the close of the King's reign.⁹⁷ There are eleven paragraphs (§§215-225) in the code dealing with the fees to the Asu, and with fines for unsuccessful operations. Both fees and fines are regulated according to the class to which the patient belongs. The *mar amêli*, equivalent to our well-born gentleman, pays ten shekels for an operation for an eye wound, made with a bronze lancet, while a plebeian gets a reduction of fifty per cent, and a slave is charged only two shekels to be paid by the owner. If a slave, in consequence of an operation, dies, the physician must supply another slave. If the slave loses an eye, the physician pays half the value of the slave, but if the Asu is unfortunate enough to destroy the eye of a gentleman or of a plebeian, or if a patient of either of these two ranks dies, the physician's hand is cut off—in order to render him harmless for the future. For setting a broken bone or for the cure of an injured limb, the fee is five shekels for the well-born, three shekels for the plebeian and two shekels for a slave.

⁹⁴ Literally: "sickness of the muscles."

⁹⁵ A massage.

⁹⁶ This appears to be the correct reading of the name of the writer, as Prof. D. D. Luckenbill has pointed out, *Jour. Am. Orient. Soc.*, Pl. 37, pp. 250-253.

⁹⁷ See the translation in R. W. Rogers, "Cuneiform Parallels to the Old Testament," New York, 1912, pp. 398-405. For a survey of the Code, see Jastrow, "Civilization of Babylonia and Assyria," pp. 283-315.

Now the point of interest in these somewhat strange regulations is that they all fall within a subdivision of the code dealing with injuries. Hence, the only phase of the *Asu's* activities referred to in the code is surgery. Nothing is said of general medical treatment, and no doubt for the reason that such treatment still fell entirely within the category of religious rites, bound up with incantations. The *Asu* as surgeon, however, is not dealing with demons, but with injuries⁹⁸ to some member or organ of the body. The treatment of injuries is, therefore, logically dealt with in the part of the code devoted to assault and battery, to blows and wounds inflicted accidentally or intentionally on someone by a fellow being; and it is worth noting that this subdivision of the code (§§196-233) is introduced by the *lex talionis*,⁹⁹ as the fundamental principle regulating the punishment read. In its original form, this *lex talionis* read as follows:

If a man destroys the eye of another,
His eye shall be destroyed.
If he breaks the bone of another,
His bone shall be broken.
If he knocks out the tooth of another,
His tooth is to be knocked out.

Supplementary to this primitive law of direct punishment for injuries, paragraphs are added, reflecting a later stage of society when fines take the place of bodily tortures. If the injured party is a plebeian, one *mana*¹⁰⁰ is imposed for an eye or bone, and one-third of a *mana* for a tooth, whereas in the case of a slave one-half of the price of a slave is the compensation to the owner for the loss of an eye or a broken bone, rendering the slave by so much less valuable. Nothing is said about the broken tooth of a slave, because the injury does not affect the value of the slave. The old *lex talionis* is limited to the case of an injury done to

an individual by an equal. The *Asu* as surgeon inflicts an injury in case his treatment is unsuccessful, and therefore must pay a fine. But while he thus cuts loose from the physician as an exorciser, the surgeon passes from the Babylonian-Assyrian point of view to a lower plane. He is taken out of the priestly class and degraded to that of a mechanic or, let us say, a butcher. The *Asu* as surgeon does not appeal to *Ninib* and *Gula* for aid in driving out a demon. He has no recourse to incantations and magic rites, supplemental to the medicinal remedies, supposed to have their effect on the demon as the cause of the disease. The operator depends solely on his knife—the Babylonian would say *merely* on his knife—which is generally of bronze. The *Asu* as physician is the instrument of the gods, but the moment he takes an instrument into his own hands he is only an ordinary man who becomes subject to the law of injuries. The *Asu* as surgeon is responsible for the result of his work, whereas if in his treatment of disease the demon worsts the *Asu* and the patient dies, it is a misfortune for the patient for which the *Asu* is not to blame. The attitude of the Hammurawi Code towards surgical operations was *medicus caveat*—the surgeon must not risk failure. If the eye is destroyed, it is due to the *Asu* who ought to have done better. With cruel logic, the code refused to recognize an operation as successful if the patient succumbs, though we have noted the inconsistency that in the case of medicinal treatment the death of the patient was regarded in a different light. The surgeon had to pay a fine in case of an unsuccessful operation, just as the code provides (§ 5) that if a judge renders a wrong decision, it is not the decision that is reversed but the judge, by being removed from the bench, in addition to paying a heavy fine.

⁹⁸ The term used is *zimmu kabtu*, "heavy blow" or wound.

⁹⁹ §§196-201.

¹⁰⁰ Sixty shekels.

The lower dignity accorded to the surgeon as against the "medicine man" left its trace on medicine up to a late period. The barber's pole—his symbol as a surgical operator—survives as evidence for the small value attached to the functions of the surgeon, which were in many cases committed to the barber, though generally limited to bleeding, cupping and extracting teeth. Modern surgery, which takes its rise with Ambroise Paré (1517–1590), has, of course, changed this and given to the surgeon his present high standing, but I venture to raise the question whether the distinction still made in England between the physician who is called "Doctor" and the surgeon who is addressed as "Mr." may not in the last analysis be a survival from the older days when the surgeon stood on a lower level than his colleague, the medical practitioner.

The attitude towards the surgeon, as exemplified in the regulations of the Hammurawi Code, accounts for the fact that in the medical texts of Babylonia and Assyria, as in the lists of letters supplemental to these texts, we encounter no reference whatsoever to the surgeon but only to medical treatment through drugs, liniments, salves, massage and diet—all with the one object of effecting a cure by driving the demon out of the body. On the other hand, it is interesting to note that as early as the days of the Hammurawi Code, surgery had advanced to the stage of differentiation between the surgeon and the veterinarian. The latter was called the *Asu* for the ox or ass (§§224–225). This is probably the earliest instance of specialization in medicine, though the fact that the distinction was made was due again to the lower grade assigned to the surgeon as against the

medical practitioner, who as an exorciser of demons would have considered it beneath his dignity to treat animals. He was hide-bound by the theory that demoniac possession was limited to human beings.

XIII

A rapid survey of the influence exerted by Babylonian-Assyrian medicine upon the ancient world may close this article. That influence runs parallel with the wide spread of Babylonian-Assyrian methods of divination. Babylonian-Assyrian hepatoscopy and astrology passed beyond the bounds of the Euphrates Valley to find their way to the Hittites, Hebrews, Greeks and Romans;¹⁰¹ and the medical methods developed in the Euphrates Valley similarly spread to the cultural nations of antiquity, as supplemental to divination lore. We can trace that influence in the medicine of the Jews of the Talmudic period. In the great legal compilation of the Jewish rabbis known as the Talmud,¹⁰² we come across general points of view and details in treatment that can be carried back directly to Babylonian-Assyrian prototypes. The advanced monotheism of the Jews did not succeed in driving out the popular belief in demons, hobgoblins, vampires and all manner of semi-divine beings of a sinister character, just as early and medieval Christianity found room by the side of the Trinity for devils and angels. Popular beliefs are too deeply imbedded to yield to metaphysical speculations as to the method of divine government of the universe by a single spiritual power. The Talmud furnishes us with magic incantations to be recited as a means of driving off the evil demons. The stimulus given to medical treatment of a more scientific character through the contact of

¹⁰¹ See the proof in the author's monograph, "Babylonian-Assyrian Birth Omens and Their Cultural Significance," pp. 3–4, and more fully in his "Religion Babylonians and Assyrians" ii, 320, *et seq.* and 741–749.

¹⁰² See Ebstein, "Die Medizin im Neuen Testament und im Talmud," Stuttgart, 1903, and Preuss, "Bibisch-Talmudische Medizin," Berlin, 1911.

the Orient with Greek civilization that had given birth to the medical schools of Hippocrates and Galen led to the practical abandonment of the theory of demoniac possession as the cause of disease, but medical treatment in the Talmud remained on the same level as in Babylonia and Assyria. As late as the days of Josephus we come across beliefs in the power of individuals to drive demons out of the body by means of certain roots attached to a ring placed in the nostrils of a victim. Josephus, "Antiquities," viii, 2, 5, tells us also of a root *baaras* that was supposed to have the power when brought to a sick person of driving the demon away. This crude manner of affecting the demons is an indication of the fading belief, reflecting a period when it was no longer regarded as plausible that by taking a medical prescription the cure involved the departure of a demon out of the body. Demoniac possession becomes limited to abnormal mental manifestations like insanity and hallucinations. In this form it appears in the New Testament,¹⁰³ but for all that the remedies themselves that are set forth in Talmudic passages parallel the pharmacopœia of Babylonia and Assyria, including a Dreckapotheke.¹⁰⁴ Such a detail, as that medicines should be taken in wine, forms too close a parallel to what we so frequently find in Babylonian-Assyrian texts to be an accident. We have the proof also that in Syria the Babylonian-Assyrian methods of medical treatment remained in popular usage long after the more scientific Greek medicine had made its way throughout the ancient world. Attached to an elaborate Syriac "Book of Medicines," published a few years ago by E. A. Wallis Budge,¹⁰⁵ embodying for the larger part a

transcript of Greek medicine, is a chapter of "native prescriptions,"¹⁰⁶ and here we encounter the familiar remedies of Babylonian-Assyrian medicine as, for example, for a disease of the heart:

Burn the bones of partridges (?) until they become a fine powder. Pour this powder into olive oil and warm the mixture and smear it on the head and sprinkle vinegar on the head.

Or again:

Pound the insides of walnuts with garlic and apply to the head.

For eye trouble, the following is prescribed:

Take 30 drachmas of juice of anethum fœniculum and 10 drachmas of honey and 30 drachmas of sweet pomegranates, mix together. Set the mixture on a fire and boil. Take it off the fire, keep it in a glass vessel and pour onto the eyes when the belly is empty.¹⁰⁷

Still closer to the style of Babylonian-Assyrian prescriptions are the following:¹⁰⁸

For insides¹⁰⁹ which will not retain food, boil thorns in water and let the patient drink it.

For wind on the stomach, pound peppercorn and cinnamon reed. Work into a paste with honey and let the patient eat 3 drachmas for two days.

For a very sick person, give him to drink of the sweat of his feet mixed with excrements.

For one who has been poisoned, let him drink the urine of a child, mixed with wine or gall of a gazelle in goat's milk.

Among other ingredients of the "native" Dreckapotheke, clearly intended to disgust the demons as well as the patient, we have such substances as the testicles of a fox for breasts too full of milk, or the gall of a

¹⁰³ See the passage quoted above, p. 244, note 73.

¹⁰⁴ See examples in Preuss, "Biblisches-Talmudische Medizin," p. 509.

¹⁰⁵ "Syrian Anatomy, Pathology and Therapeutics" or "The Book of Medicines," 2 vols., text, translation and introduction, Oxford, 1913.

¹⁰⁶ Vol. ii, pp. 656-714.

¹⁰⁷ A parallel to the frequent injunction in Babylonian-Assyrian texts to take a mixture "without food."

¹⁰⁸ Budge, II, pp. 674-675.

¹⁰⁹ The word *leb* (Babylonian *libbu*) is used to designate the "insides" in a general and vague way.

pig to be burnt under a person who has a sore in the arms, or the fat of a black serpent with a red neck and the gall of a pig to be applied to the anus, or the dung of a white dog. The person who has gas in the stomach should drink this mixed with sugar and water "and his insides will be loosened and he will have relief."

Such remedies are clearly remnants of Babylonian-Assyrian medicine, preserved perhaps for centuries by oral tradition until they were embodied in the collections made by native "quacks," who continued to flourish by the side of the better educated physicians.

The rival of Babylonian-Assyrian medicine in point of age is Egyptian medicine, of which we now know a great deal, thanks to the discovery and publication of several medicinal papyri of various periods.¹¹⁰ The possible relations between the two systems is a question which must be left to a further paper.¹¹¹ That the drugs used in the Euphrates Valley should have passed to Egypt at an early period, and *vice versa*, is exactly what we should expect to have happened at an early date, now that we have ascertained that the intercourse between these two regions reverts to the second millennium before this era. In the plant and drug lists drawn up by Babylonian-Assyrian scribes, we find specific mention of substances brought from other countries—Canaan, Magan, Elam, etc. I have pointed out¹¹² that ammonia was probably introduced into Egypt through intercourse with Babylonia. Beyond such interchange, however, it may be questioned whether the Egyptian medicine had anything to learn from Babylonia, for medical practice ap-

pears to have reached a much higher plane in Egypt. The oldest medical papyrus of Egypt—the Papyrus Ebers—dates back to the 16th century B. C. and is remarkably free from magic rites and incantations, though we do find, as in Babylonia-Assyrian medicine, substances like dung, the uterus and vulva of various animals introduced as drugs—which suggests that the purpose of such drugs was originally, likewise, to drive the demon out of the body. No doubt Egyptian medicine started out from the same primitive theory of demoniac possession, but it appears to have cut itself loose from the theory to a large extent at an early age. Strangely enough in medical papyri of the new kingdom, magic practices and the recital of incantations reappear as prominent factors in the treatment of disease. It is tempting to conclude that this recrudescence of primitive methods, in striking contrast to the more rational manner in which diseases are handled in the papyri of older date, was due to the influence of Babylonian-Assyrian culture, whereas the advance to more scientific methods in Babylonian-Assyrian medicine, so far as this is to be noted, may be ascribed to Egyptian influence as a factor, by the side of the natural progress which must also be assumed.

At all times, however, and despite the recrudescence of magic incantations, Egyptian medicine appears to have been far more scientific in character, and if in the case of Greek medicine, which marks the foundation of medical treatment on a basis more closely approaching that of modern days, we are to seek for any outside influence, we must turn to Egypt as a possible

¹¹⁰ The latest publication of them by Wreszinski (a) "Papyrus Ebers," Berlin, 1913; (b) "Berlin Papyrus," Berlin, 1909; "London Papyrus," Leipzig, 1912. To these is to be added "The Hearst Medical Papyrus," edited by Reisner, Univ. of California Publications (1905). See also Budge's Introduction to his edition of the Syriac "Book of Medicines,"

pp. cxxx-cxliii, for a general survey of Egyptian medicine and the further references there given.

¹¹¹ I reserve for a special article to be prepared for the *Bull. Soc. Med. Hist. of Chicago* a fuller discussion of the relations between Babylonian-Assyrian Medicine and that of the Jews and Egyptians.

¹¹² See above, p. 242, note 55.

factor. Homer, it is interesting to note, refers to Egyptian physicians, and we find Egyptian herbs mentioned in the pharmacopœia of Greek physicians. With Hippocrates, however (460-375 B. C.), an entirely new epoch in medicine is ushered in, and no doubt in the first instance it was the native scientific spirit of Greece that had manifested itself even before the days of Hippocrates, in mathematics and astronomy and in the development of philosophical thought that brought about the systematic study of human anatomy and philosophy and laid the foundations for the rational treatment of disease as against purely empirical methods, based on tradition and crude popular beliefs.

But popular beliefs and time-bound traditions have a tenacious life and survived even in Greece long after the attempt was made to convert medical treatment into a science. Just as we have down to the threshold of modern science, astrology flourishing by the side of astronomy and the exorciser plying his trade side by side with the spiritual guide, so we have the Babylonian-Assyrian *Asu* surviving by the side of the Greek *iatros*. Indeed, in our own days we still have the astrologer as the successor of the Babylonian-Assyrian *barû*,¹¹³ and likewise the medicine-man and the herb doctor and "quack" as the direct descendant of the *Asu*, supplying remedies that have been handed down from a hoary antiquity, dealing with disease in purely empirical fashion and introducing all kinds of hocus-pocus that suggest the old theory

¹¹³ The "seer," used for the one who inspects the liver, equally with the priest who searches the skies for omens.

of demoniac possession as the source of disease.

It is an observation that may frequently be made, that after a civilization passes away, its weaker aspects continue to exercise a more or less pronounced influence. There is a strange fatality in the manner in which "the evil that men do lives after them, the good is oft interred with their bones." Babylonian-Assyrian civilization can point to great achievements in art, literature, trade and government that exerted a strong and wide influence for good in the ancient world; but after it passed away—leaving scarcely any visible traces until the spade of the explorer dug up the remains of the civilization out of the mounds that formed over the places where once great cities stood—the beliefs and theories of a purely primitive character, which were carried along in the waves of influence that flowed from the Euphrates Valley, continued their sway. These beliefs and theories became in the course of time unofficial appendages to astronomy, religion and medicine; they were degraded to the rank of superstitions; they were finally denounced as heterodox, but their vitality remained unimpaired. And so the Babylonian-Assyrian *Asu* may still be found in the by-ways of American and European cities. In these times when we are living under the sign of the germ theory of disease, there would be a certain poetic justice in the apparition of an old *Asu* of Babylonia-Assyria rising out of his grave, and exclaiming with his bony finger directed to the ultramodern pathologist, "There, I told you so thousands of years ago—it's all due to the demons."

ON A GREEK CHARM USED IN ENGLAND IN THE TWELFTH CENTURY

By CHARLES SINGER, M.D.

OXFORD, ENGLAND

IN the Library of St. John's College, Oxford, is a large folio volume (MS. 17), containing an encyclopædia of secular knowledge, perhaps the earliest mediæval work of its kind that has yet come to light. It is composed under the strong traditional influence of Bede. We have described the MS. elsewhere and have shown that it was written between 1110 and 1112 by an English speaking monk who was ignorant of Norman French.¹ The MS. contains numerous glosses nearly all of which are in the same hand as the text.

A rather surprising feature of this encyclopædia is the acquaintance with Greek that it betrays especially in the medical sections. The knowledge of Greek is, it is true, little more than vestigial, but even that degree was unusual in Western Europe during the profound intellectual depression of the 10th, 11th, and early 12th centuries.

The interest in the Greek language taken by the author, or rather the compiler, is shewn in various ways. Thus there are several Greek alphabets scattered through the volume. Again, derivation from the Greek had the same fascination for the English monk as was exhibited by St. Isidore of Seville and by Bede. He tells us, for instance, that the name of the month April is derived from Aphrodite. "Aprilis pro uenere dicitur quasi afrodis grece enim uenus dicitur."²

"April is named after venery or Aphrodis for Venus is called in Greek Aphrodis." *Afrodis* is for ἀφρώδης, an adjective formed from ἀφρός = foam. Again "Eliotropium id est intuba a grecis sive solsequia uel sponsa solis." "The heliotrope of the Greek, that is intuba, either the sweetheart or the bride of the sun."³ In one instance, also, the Greek script is used, namely for the legends of a circle of Petosiris.⁴

In the medical section the author has borrowed largely from the contemporary Salernitan writings, and from them he may have derived a number of medical terms of Greek origin, such as *anastomo*, *plagiotimo*, *anacarsis*, *malanma*, *dissentericus*, *emotoicus*, *cephalica*. In some cases, however, there is a suggestion of a more intimate contact with Greek sources, and a correspondingly greater degree of misunderstanding of them. Thus in a section on bloodletting we read:

Inciditur autem de flebotomo optimo rectam percussuram *catatixin*. habet hoc est in iussum primere flebotomum rectum. & sursum leuare. Quod si male incisa fuerit. collectionem in altum facit. & uulnera insaniosa facit. insaniamque plurimam. & spissa nutrit uulnera. & deducit ad omnem perniciem.⁵

"[The vein] is best incised with the lancet *catatixin*, that is with a direct cut, and it is the practice to raise the lancet with the point passing it straight and upwards. For if

³ Fol. 176 recto column b.

Eliotropium is, of course, ἡλιοτρόπιον. *Intuba* is the Virgilian *intibum*, endive or some such plant. The interpretation of *solsequia* is more difficult. I have regarded *sequia* as equal to *secia* a mediæval form of *sexa*. Possibly it is falsely derived from *sequor*.

⁴ Folio 8 recto.

⁵ Folio 2 recto col. b.

¹ Charles Singer: "A Review of the Medical Literature of the Dark Ages with a New Text of about 1110," *Proc. Roy. Soc. Med.*, London, 1917, vol. x (Section of History of Medicine, pp. 107-160) and "A Medical Compendium of the First Half of the Twelfth Century" in the *Bull. Soc. Med. Hist. Chicago*, 1917.

² Fol. 17 verso.

it should be badly cut, a deep gathering is formed which makes the wound extremely unhealthy, generates chronic lesions and gives rise to all kinds of trouble."

This *catatixin* is clearly the κατ' ἑξιν of Hippocrates who uses it as describing the *same side* and distinguished from the *opposite side*. Hippocrates⁶ says that if a person with enlarged spleen has hæmorrhage from the *same* (that is the left) nostril, it is a good sign, but if ἀνάπαλιν from the *opposite* (that is the right) nostril, it is bad, an idea which afterwards gave rise to the famous controversy as to "derivation" or "revulsion." Galen uses the expression κατ' ἑξιν in a commentary on this very passage of Hippocrates.⁷ He there takes the view that venesection should be performed κατ' ἑξιν on the *same side* as the disease. The author of our MS. has misunderstood Galen's phrase and takes him to mean that venesection should be performed *with a straight up and down cut*.⁸ The error may have arisen from the use of the ambiguous Latin word recte, to translate κατ' ἑξιν.

The most interesting point of contact with the Greek language in the MS. is, however, in a marginal gloss by the same hand as the rest of the volume. It occurs in the course of a section on the preparation of plasters and runs as follows (Fig. 1):

Wid⁹ blod rine of nosu wriht on his forehead on Xpistis mel.

	Stomen	meta	calcos . +.
		folu	
		+	

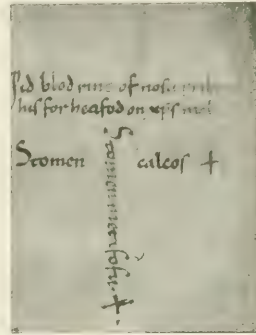
⁶ Prorrhethics, I, 125, Littré, Vol. v, p. 554.

⁷ The passage in question is in Galen's "De curandi ratione per venae sectionem" cap. XV. Kühn's edition xi, 295-6, and runs as follows:

«τὸ δὲ κατ' ἑξιν ὅτι κατ' ἐξ ἑνὸς λέγει, πᾶσιν ὁμολόγηται σαφέστατον κεχρημένου πολλάκις ἐπὶ τοῦδε τοῦ σηματονομένου τῇ κατ' ἑξιν φωνῇ. τὰ δ' ἀνάπαλιν αἱμορραγοῦντα μηδὲν ὠφελεῖν ἢ καὶ βλάπτειν ἐνόησε τῷ καταλίσσει τὴν δύναμιν ἀνευ τοῦ τοῦ πάθος κυρτάσι.»

The top line in Anglo-Saxon may be translated "If blood run from the nose write on his forehead in a Christ's cross," and then follows the charm.

As regards the charm itself, it is nothing else than a quotation from the Greek Lit-



urgy of St. John Chrysostom still in use by the Orthodox Church. The passage occurs in the most solemn part of the service before the distribution of the sacred elements, the priest reciting

Στῶμεν καλῶς· στῶμεν μετὰ φόβου· πρόσχωμεν τὴν ἀγίαν ἀναφοράν ἐν εἰρήνῃ προσφέρειν.

"Let us stand seemly, let us stand in awe; let us accept the holy memorial which is offered in peace."

STOMEN CALCOS STOMEN META FOFU

was read for

ΣΤΩΜΕΝ ΚΑΛΩΣ ΣΤΩΜΕΝ ΜΕΤΑ ΦΟΒΟΥ

The scribe has transliterated the Greek with two exceptions. He has written calcos for kalos and fofu for fobou. How did these errors arise? There is a complete explanation for them.

⁸ I have to thank my friend Dr. E. T. Withington for drawing my attention to Galen's true meaning and for pointing out to me some errors in my previous interpretation of this passage.

⁹ [Folio 175 recto.] As will be seen from Fig. 1 the MS. gives Wid. We have restored the cross stroke to the d, as seems required by the context.

In early MSS., the letter *kappa* often takes a form something like IC, the stem of the *κ* being completely separated from

ΤΟΥ ΕΝΑΓΙΟΙΣ ΠΡΟΣ ΗΜΩΝ ΙΩΑΝΝΟΥ
 ΑΡΧΙΕΠΙΣΚΟΠΟΥ ΚΩΝΣΤΑΝΤΙ-
 ΝΟΥ ΠΟΛΕΩΣ ΤΟΥ ΧΡΥΣΟΣΤΟΜ
 ΕΡΜΗΝΕΙΑ ΕΙΣ ΤΟΙΣ ΚΑΤΑ ΜΑΤΘΑΙ
 ΟΝ ΕΥΑΓΓΕΛΙΟΝ ΒΙΒΛΙΟΝ Β: ~

ΤΟΥ ΕΝΑΓΙΟΙΣ Π(Σ)Ρ(Ο)Σ ΗΜΩΝ ΙΩΑΝΝΟΥ
 ΑΡΧΙΕΠΙΣΚΟΠΟΥ ΚΩΝΣΤΑΝΤΙ
 ΝΟΥ ΠΟΛΕΩΣ ΤΟΥ ΧΡΥΣΟΣΤΟΜ
 ΕΡΜΗΝΕΙΑ ΕΙΣ ΤΟ ΚΑΤΑ ΜΑΤΘΑΙ
 ΟΝ ΕΥΑΓΓΕΛΙΟΝ ΒΙΒΛΙΟΝ Β: ~

the rest of the letter. We give here (Fig. 2) a facsimile with transcription from the title of a 9th century MS. of the sermons of St. John Chrysostom¹⁰ which illustrates well this tendency. The second line of this facsimile shows two *kappas* either of which could easily be read IC.

¹⁰ The facsimile is from a MS. found in a secret crypt in the Monastery of the Transfiguration at Meteora. It is the earliest dated Greek MS. that has yet come to light and is described in "Un Manuscrit des

The third line of the same facsimile similarly shows an *ω* that can be mistaken by a careless reader for CO. Thus ΚΑΛΩΣ in the original became CALCOS in transcription. The passage of ΦΟΒΟΥ into FOFU is equally simple. The F as a representative of the letter *beta* is by no error but is a true presentation of the Byzantine pronunciation. The U of the word FOFU is an ignorant error for the usual MS. method of writing the diphthong OU (cp. Fig. 2, line 3).

We thus have the very remarkable phenomenon of a passage in the Communion Service of the Greek Church in actual use as a charm in England in the 12th century and probably earlier. The source of this remedy for nosebleeding was doubtless unknown to the scribe who has preserved it for us. The fact may, however, suggest to the folklorist a new field of research into the origin of other apparently gibberish charms and folk sayings, and to the medical historian further reflexion on the continuity of Greek influence during the darker age of his science.

Météores de l'an 861-2" in the *Revue des Études Grecques* xxvi, p. 53, Paris, 1913. Our fig. 2 is taken from this work.

SORANUS OF EPHESUS AND MARION SIMS

In the brilliant reign of Hadrian lived Soranus, who had been the tutor of Atticus. He devoted himself chiefly to the diseases of the female sex, and wrote the only complete treatise on the subject which has come to us from antiquity. His work, remarkable for its fullness of knowledge, shows him to have been something of an enthusiast; and we can think of him in his evening walks near the splendid walls of high-turreted Rome,—the altæ mœnia Romæ that Virgil loved,—or returning from the Athenæum, as wondering what were to be the developments following his labors and the instruments he had invented. Had his eye

penetrated into the future, there would have appeared to him, standing on a platform in what would have seemed a most singular garb, but with features similar, because as regular in outline as those to which he was accustomed, a youth with a roll in his band, and, attracted by the look of genius in his face, he might well have wished him strength to carry out resolves that were to lead to immortality:

Maecæ nova virtute puer; sic itur ad astra.

And that wish would have been fulfilled in the creation of a science that owes everything to him,—to him, Marion Sims.

J. M. DaCosta (1891).

THE LEGISLATIVE AND ADMINISTRATIVE HISTORY OF THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY DURING THE REVOLUTIONARY PERIOD (1776-1786)

By COLONEL WILLIAM O. OWEN, U. S. ARMY

CURATOR, ARMY MEDICAL MUSEUM, WASHINGTON, D. C.

SECTION II

SINCE the first section of this valuable archivistic material has already been prefaced by Colonel Owen's salient cullings from the records, these few words of recapitulation will suffice.

From unorganized beginnings, the formation of official medical service may be traced in the scattered items of the Journals of the Provincial Congress of Massachusetts (1775), supplemented by excerpts from the *Military Journal* of Thacher, who, as surgeon's mate to the senior surgeon, Dr. John Warren, was active in these early days. In the Journals of the Continental Congress from June 2nd, 1775 to April 7th, 1777, the story is carried through the appointment and dismissal of Benjamin Church, the Director General and Chief Surgeon of our first Army Hospital, and of Dr. Stringer whose conduct was pronounced "highly derogatory to the honor of Congress." The office of Surgeon General and less important positions under revolutionary medical service were destined to be stumbling blocks for many.

At this point, the excerpts in this second installment take up the account with the ignominious dismissal of Church's successor, Dr. John Morgan on August 3rd, 1777. Dr. Rush, Chief Physician in the Middle District, is forced to resign his commission to Dr. Jonathan Potts at about the same time. By June 10th, 1778, this worthy gentleman is charged with "exorbitant expenditure" and indeed the numerous successive entries in the Journal of requisitions for fifty and one hundred thousand dollars, "for which

Dr. Potts is to be held accountable" would perhaps need more explanation than the depreciated value of Continental paper then obtaining.

In the light of modern war reconstructive work, the provision for an Invalid Corps under date of May 27th, 1777, to be composed of men disabled for rigorous war service but capable of acting in the capacity of military instructors and garrison guards, is illuminating. Interest also centers around the unfortunate circumstances at the Alexandria inoculation camp in which the conscientious Dr. Rickman was involved. His work was later exonerated by tracing the cause of the unsuccessful results to incompetent assistants and the malarial breeding swamps through which the men were taken on forced march immediately before inoculation.

The beginnings of our present pension system, odd means of disciplining those contracting venereal disease, unusual reports of the extravagance at the Yellow Springs Hospital under a certain Alexander McKallaher, "allowed to do so by Congress or Dr. Shippen, the informant is not certain which," and the complaints about food and clothing,—all these rather modern problems are interwoven with the many entries which group themselves around the story of Dr. Shippen's court-martial. From June 4th, 1778, when Shippen was accused of malfeasance in office by the counter-charges of the deposed Dr. Rush, until his acquittal August 18th, 1780, the machinations of Dr. Morgan and other derogators are but slightly hidden in the record which follows.—EDITOR.

II. FROM JOURNALS OF THE CONTINENTAL CONGRESS (1774-83) (Continued)

April 8, 1777. 243, 244-6

That the eldest son of General Warren, and the youngest son of General Mercer, be educated, from this time at the expence of the United States.³³

Congress resumed the consideration of the report on the hospital; Whereupon,

Resolved, That in time of action and on any other emergency, when the regimental surgeons are not sufficient in number to attend properly to the sick and wounded, that cannot be removed to the hospitals, the director, or deputy director general of the district, be empowered and required, upon the request of the physician and surgeon general of the army, to send, from the hospitals under his care, to the assistance of such sick and wounded, as many physicians and surgeons as can possibly be spared from the necessary business of the hospitals.

That the director, deputy directors general, assistant deputy directors, physicians and surgeons general, be and they are hereby required and directed to employ such parts of their time, as may conveniently be spared from the duties before pointed out to them, in visiting and prescribing for the sick and wounded of the hospitals under their care.³⁴

That the establishment of the medical department be as follows:

1 director general....	6 dollars a day and 9 rations.		
3 deputy directors general.....	5 do.	6 do.	
Indeterminate assistant deputy director.	3 do.	6 do.	
4 physicians general and 4 surgeons general each.....	5 do.	6 do.	
1 to each army, physician and surgeon general of the army.	5 do.	6 do.	
Senior surgeons.....	4 do.	6 do.	
Second surgeons.....	2 do.	4 do.	
Surgeons' mates.....	1½ do.	2 do.	
Apothecaries general.....	3 do.	6 do.	
Mates.....	1½ do.	2 do.	
Commissary.....	2 do.	4 do.	
Clerk, who is to be paymaster.....	2 do.	4 do.	
Assistant clerks.....	2, 3 do.	1 do.	
Stewards.....	1 do.	2 do.	
Matron.....	½ do.	1 do.	
Nurses.....	24-90	1 do.	
Stabler.....	1 do.	1 do.	
Regimental surgeons.....	2 do.	4 do.	
Do. mates.....	1 1/3	2 do.	

Ordered, That the regulations respecting hospitals be published.

April 9, 1777. 247

Resolved, That to-morrow be assigned for nominating gentlemen for the offices of director and deputy directors general, physicians general and sur-

geons general of the military hospital, and the physicians and surgeons general of the respective armies, and that the election be on the day following.

April 11, 1777. 253-5

Congress then proceeded to the election of the officers in the hospital department; and the ballots being taken,

Dr. William Shippen, Jun^r was chosen, by the unanimous vote of the thirteen states, director general of all the military hospitals for the armies of the United States.

Dr. Walter Jones, was elected physician general of the hospital in the middle department.

Dr. Benjamin Rush, was elected surgeon general of the hospital in the middle department.

Dr. John Cochran, was elected physician and surgeon general of the army in the middle department.

Dr. Isaac Forster, deputy director general of the hospital in the eastern department.

Dr. Ammi Ruhamah Cutter, physician general of the hospital in the eastern department.

Dr. Philip Turner, surgeon general of ditto.

Dr. William Burnet, physician and surgeon (general) of the army (in the eastern department).

Dr. Jonathan Potts, was elected deputy director general of the hospital in the northern department.

Dr. Malachi Treat, physician general of ditto.

Dr. Fergue, surgeon general of ditto.

Dr. John Bartlett, physician and surgeon general of ditto.

The Board of Treasury reported,

That there is due to Dr. J. Ramsey, and to be paid to the honorable Jonathan Elmer, Esq^r for sundry medicine supplied the New Jersey troops, the sum of £9 3 6 equal to 24 42/90 dollars;

That there is due to Dr. James Tilton, for sundry medicine supplied the battalion of the state of Delaware, the sum of £10, equal to 26 60/90 dollars;

That there is due to Dr. William Currie, for sundry medicine supplied the 5, or Colonel Johnston's Pennsylvania battalion, the sum of £50 17 2 equal to 135 56/90 dollars.

April 12, 1777. 257

Resolved, That 100,000 dollars be advanced to Dr. Shippen, director general, for the use of the hospitals; he to be accountable.

Resolved, That the surgeons general and physicians general of the hospitals, shall, each of them regulate the practice of both physic and surgery, and do the duty of physician and surgeon general in the hospitals respectively committed to their charge, and that the director and deputy directors general take proper care to keep the sick and wounded in separate departments.

April 17, 1777. 274-5

That there is due to Dr. William Smith, continental druggist, for sundry medicine purchased by him for public use, the sum of 2,820 30/90 dollars, and for sundry medicine supplied by him for the use of the brig *Lexington*, the sum of 131 38/90 dollars, both sums making 2,952 28/90 dollars;

³³ This report, in the writing of Benjamin Rush, is in the *Papers of the Continental Congress*, No. 19, V, folio 151.

³⁴ These two paragraphs, in the writing of James Wilson, are in the *Papers of the Continental Congress*, No. 22, folio 26 1/2.

That there is due to Dr. William Currie for sundry medicine supplied the sick of the 4th and 6th Virginia regiments, the sum of 99 66/90 dollars.

April 22, 1777. 288-90

Resolved, That a Corps of Invalids be formed consisting of eight Companies, each Company to have one Captain, two Lieutenants, two Ensigns, five Sergeants, six Corporals, two Drummers, two fifers and one hundred Men. This Corps to be employed, in Garrisons and for Guards, in Cities and other Places, where Magazines or Arsenals are placed; as also to serve as a Military School for Young Gentlemen, previous to their being appointed to marching Regiments, for which purpose, all the Subaltern Officers, when off Duty, shall be obliged to attend a Mathematical School, appointed for the purpose to learn Geometry, Arithmetick, vulgar and decimal Fractions and the extraction of Roots. And that the Officers of this Corps, shall be obliged to contribute one day's pay in every Month, and Stoppages shall be made of it accordingly, for the purpose of purchasing a Regimental Library of the most approved Authors on Tactics and the Petite Guerre.

That some Officers from this Corps be constantly employed in the Recruiting Service, in the Neighbourhood of the places they shall be stationed in, that all Recruits so made, shall be brought into the Corps, and drilled and afterwards draughted into other Regiments as occasion shall require.³⁵

Inform General Washington that Surgeons' Mates are appointed and their Pay fixed. Pay and Rations of Regimental Surgeons and Mates same as second surgeons in the Hospital.³⁶

Resolved, That the farther consideration of the report be postponed.

Resolved, That the director and deputy directors general, shall constantly publish in the news-papers, the names of the places in which their military hospitals are respectively kept; and the several commanding officers of parties, detachments, or corps, on their march to or from the camp, shall send to the said hospitals, such of their officers and soldiers, as, from time to time, are unable to proceed, together with certificates to the director or deputy director general, mentioning the names of the said officers and soldiers and particular regiments to which they belong; unless, from the distance of the hospitals, or other causes, it shall at any time be necessary to deliver them to the care of private physicians or surgeons, in which cases, such physicians and surgeons, and also the respective commanding officers, are forthwith to report their names and regiments to the director or deputy directors general as aforesaid, who shall give the necessary orders for removing them to the hospitals as soon as may be, and discharge the reasonable demands of the physicians and surgeons conducting agreeable to this resolve.

That the director, deputy directors general and assistant deputy directors, have power to order to their respective hospitals, the sick and wounded of

the army, wherever found, in their own or other departments, provided such other departments are not supplied with any of the officers aforesaid.

April 23, 1777. 292

Resolved, That Dr. James Tilton be authorized to repair to Dumfries, in Virginia, there to take the charge of all continental soldiers that are or shall be inoculated, and that he be furnished with all necessary medicines: that the commanding officers in that department be directed to afford every assistance in their power, and that all commissaries and quarter masters on whom the doctor shall have occasion to call, be directed to provide quarters and everything requisite for this business.

April 25, 1777. 300

Resolved, That the physician or surgeon general of the hospital in the middle department, be directed to send a proper person or persons in the medical department, to visit all the hospitals betwixt this city and the town of Annapolis, in Maryland, with directions to order all such soldiers, as shall be deemed capable of service, to join immediately their respective corps under proper officers.

April 30, 1777. 317

Resolved, That Major General Schuyler be directed to send a proper officer, to hasten the march of the Carolina continental troops, supposed to be now on their way to head-quarters; that they halt at Dumfries, Colchester and Alexandria, in Virginia, there to pass through inoculation; which the hospital surgeons, lately despatched from this city to Dumfries, are directed to see effected, with the greatest despatch.

May 2, 1777. 321-2

That there is due to Christopher, jun. and Charles Marshall, for sundry medicine and chirurgical instruments supplied by them for the use of different battalions of continental forces, the sum of £1,556 16 6, equal to 4,151 48/90 dollars:

That there is due to Dr. George Glentworth, for sundry medicine supplied the sick of Captain Doyle's company in continental service, the sum of 28 48/90 dollars:

That there is due to Dr. Frederick Phile, for sundry medicine administered by him to several battalions of continental forces, the sum of £492 2 9, equal to 1,312 33/90 dollars.³⁷

Ordered, That the said accounts be paid.

May 8, 1777. 335

A letter, from Governor Livingston, to Dr. Wither- spoon, dated Haddonfield, May 7, was laid before Congress and read, wherein he requests a guard of 25 or 30 continental troops, for purposes therein mentioned; Whereupon,³⁸

May 20, 1777. 371

A letter . . . of the 19th, from Dr. W. Shippen, director general; . . .³⁹

³⁵ This letter is in the *Papers of the Continental Congress*, No. 68, folio 255.

³⁶ The letter of Shippen is in the *Papers of the Continental Congress*, No. 78, XX, folio 403.

³⁷ See under June 20, 1777, post.

³⁸ This report is in the *Papers of the Continental Congress*, No. 147, I, folio 147.

³⁹ This report, dated April 29, is in the *Papers of the Continental Congress*, No. 136, I, folio 141.

May 27, 1777. 389-90

Resolved, . . . by the resolutions of Congress of the 26th day of August, 1776, to make provision for the maintenance of disabled wounded soldiers, belonging to their respective States, and to keep a regular account of the expence attending the same, that, at a future day, the Continent may be charged therewith:

May 28, 1777. 394

A letter, of the 27th, from Dr. B. Rush, was read:

Ordered, That it be referred to the Medical Committee.

June 20, 1777. 482

Resolved, That a corps of invalids be formed. . . . This corps to be employed . . . , and for guards in cities and other places where . . . , or hospitals are placed; . . .

June 23, 1777. 490

A . . . letter of the 20th, from Dr. W. Shippen, informing that Dr. Walter Jones, for weighty reasons, cannot accept the honour Congress did him in appointing him physician general of the hospitals of the middle department; and that he gives this information at the desire of Doctor W. Jones; . . .⁴⁰

July 1, 1777. 517, 518

Resolved, That there be advanced to Dr. W. Shippen, director general of the military hospitals, 25,000 dollars, for which he is to be accountable.⁴¹

Congress proceeded to the election of a physician general of the hospital in the middle department, in the room of Dr. Jones, who declines, and, the ballots being taken,

Benjamin Rush was elected.

July 2, 1777. 525

Congress proceeded to the election of a surgeon general of the hospital in the middle department, in the room of Dr. Rush; and, the ballots being taken, Dr. William Brown was elected.

July 3, 1777. 527

A letter . . . of the 22 June, from Jonathan Potts, at Ticonderoga; . . .

Ordered, . . . that the letter from Dr. Potts, be referred to the Medical Committee.

July 5, 1777. 532.

The said Board farther reported that a warrant should be drawn by the president on Benjamin Harrison, Jun^r, Esq^s, deputy pay master general of the southern department, in favour of Colonel William Aylett, deputy commissary general in the said department, for 54,000 dollars, for which the said Commissary General is to be accountable.⁴²

July 7, 1777. 538

That there is due to Messrs. Caldwell & Co. for sundry medicine delivered William Smith, continental druggist, for the use of the United States, the sum of 666 60/90 dollars:

(*Ordered*, That the said account be paid.)

⁴⁰ The letter of Shippen is in the *Papers of the Continental Congress*, No. 78, XX, folio 115.

⁴¹ This report is in the *Papers of the Continental Congress*, No. 130, I, folio 271.

⁴² This paragraph formed part of a report, dated July 2, which contained two other paragraphs, both of which were ordered" to

July 12, 1777. 547

That there be advanced to Dr. William Shippen, director general of the hospitals, 8,000 dollars, for which he is to be accountable:

July 16, 1777. 554-6

Resolved, That the pay and subsistence of surgeons in the navy, be equal to the pay and subsistence of the lieutenants of the vessels to which they shall respectively belong.

Resolved, That, for carrying into execution the resolve respecting Colonel Nicola's corps of invalids, the following plan, for raising one company, be adopted for raising the whole of the said corps:

1. That the director general of the continental hospital be desired to give directions to the Physicians and surgeons, in the different departments at a reasonable distance from Philadelphia, that, before they discharge any serjeants, corporals, or private men from the hospitals as unfit for service, they consider, whether such men are actually, or likely soon to be capable of doing garrison duty; and, if thought so, to mention it in the discharge, that they may not be entirely discharged from the service, but transferred from the regiment to which they actually belong, to that of invalids; and that in case such men are at a distance from their respective regiments, that the director or steward of each hospital send such men to Philadelphia, in the best manner circumstances will admit:

2. That notice be sent, by the Board of War, to the generals commanding the armies, of the raising a corps of invalids, and that they be desired to give orders to the officers commanding regiments, that, in case they have any serjeants, corporals, drummers, or private men, deemed incapable of doing field duty, such men should be examined by the director of the hospital or some other physician or surgeon, and, if judged fit for garrison duty, that they be not discharged, but transferred to the invalid corps, and sent to Philadelphia as soon as possible.

Men having only one leg or arm each, if otherwise capable of doing garrison duty, are to be deemed proper recruits for this corps.

3. That the following advertisement be published in the several newspapers as soon as possible, viz.

"War-Office, June, 1777: The Congress, being desirous to make provision for such men as suffer in the military service of the United States, have directed a regiment of invalids to be immediately raised for the reception of such as have already been, or may, in future, be rendered, by wounds or disorders, incapable of doing field duty, but are yet fit for garrison service. Notice is hereby given, that all persons in Philadelphia, or within twenty miles round, who are under continental half-pay, on account of incapacities contracted in the service, must, within fifteen days, repair to Philadelphia and show themselves to Colonel Nicola, in Front Street, four doors below the Coffee house, that, if judged capable

lie." These paragraphs were: "*Resolved*, That all Bedding, Blankets, Shirts and Sheets which may be necessary for the use of the Hospitals be purchased and supplied by the Clothier General."

The report is in the *Papers of the Continental Congress*, No. 130, I, folio 283.

of duty, they may be put on full pay. All other persons, who have served in the armies of the United States, within the above description, though not on half-pay, may present themselves, and, if judged capable, they will be immediately received. All such as are above twenty miles from Philadelphia must apply to the nearest continental general, field officer, physician or surgeon, who are desired to forward such as they judge fit for the corps of invalids. Officers who, from wounds or disorders contracted in the service, are rendered unfit for field duty, must signify their pretensions, with certificates from continental physicians or surgeons to the Board of War. As this corps is intended, not only as a provision for disabled officers and soldiers, but as a school for propagating military knowledge and discipline, no officers need apply but such as produce ample certificates of their having served with reputation, and having supported good characters, both as citizens and soldiers. Officers and soldiers who have engaged during the war will be preferred."

Resolved, That Enoch Welsh be appointed an ensign in the corps of invalids.⁴³

July 17, 1777. 560

Resolved, That in lieu of the advance ordered on the 12 instant to be made to Dr. William Shippen, director general of the hospitals, an order be drawn on the loan officer of Connecticut, in his favour, for 8,000 dollars, for which the said Dr. Shippen is to be accountable.⁴⁴

July 22, 1777. 570

A letter, of the 5, from Dr. W. Rickman to Mr. (Benjamin)* Harrison, was laid before Congress and read.⁴⁵

Ordered, That it be referred to the Medical Committee.

July 31, 1777. 593

A . . . letter and memorial from Dr. J. Morgan, were read.⁴⁶

Ordered, . . . that the memorial of Dr. Morgan be referred to the Medical Committee.

August 5, 1777. 608, 609

. . . That there are sick in the Hospitals and Army 3,745 soldiers, the number of which has been greatly increased by the use of bad Bread, and the Want of Vinegar, Vegetables and Soap as particularly set forth in General Washington's Letter to the Committee . . .

In the Hospital Department from the Want of Authority in the Director and Deputy Directors General to draw Supplies from the Commissary's Stores.

That the General officers as well as the Staff complain of their not receiving regularly the resolutions of Congress relative to their several offices.

That the Complaint of the General upon the be-

stowing of rank on the inferior officers of the civil Departments of the Army, corresponds with the Opinion of the Officers in general, and there is too much Reason to apprehend great inconveniences from such Measures if not rectified in future. . . .

That the Director and each of the Deputy Directors General be severally authorized to empower the Surgeon and Physician General of the Army within his respective District, to draw on the issuing Commissaries for such Articles of Provision in gross Quantities as the said Surgeon and Physician General Shall require for supporting the Sick in the flying and temporary Hospitals; and the said issuing Commissaries are respectively directed to charge such Provisions to the Director or Deputy Director General of the District, and to keep the Vouchers in separate Files in order for Settlement with the Officers aforesaid. . . .

August 6, 1777. 618

Resolved, That there be advanced to Dr. William Shippen, Jr. director general of the hospitals, the sum of fifty thousand dollars, for the use of the hospitals, for which he is to be accountable:

August 8, 1777. 623

A petition from William West, major, James M'Henry and Hugh Hodge, surgeons of the 4th and 6th regiments of ||Pennsylvania forces,|| commanded by Colonels Magaw and Cadwallader, prisoners on parole, praying to be informed, whether, as continental officers holding commissions only revocable by this or a future Congress, they are not entitled to pay while on parole, as well as when in the hands of General Howe: ⁴⁵

Ordered, To lie for consideration to Monday next.

The Medical Committee, to whom the memorial from Dr. J. Morgan was referred, brought in a report.⁴⁶

August 9, 1777. 626-7

Congress took into consideration the report of the Medical Committee which was read, as follows:

"The Medical Committee to whom the memorial of Dr. John Morgan to Congress was referred, beg leave to report, that they find from the journals of Congress, that Dr. Morgan was appointed director general and chief physician of the hospital, in the room of Dr. B. Church, October 17, 1775; that, on the 9 January, 1777, he was dismissed from said appointment; that though no cause is assigned for his discharge, yet, your committee on enquiry, find, that the general complaints of persons of all ranks in the army, and not any particular charges against him, together with the critical state of affairs at that time, rendered it necessary for the public good and the safety of the United States, that he should be displaced, and were the reasons of his dismissal; that the doctor's memorial appears to your committee to be a hasty and intemperate production; notwithstanding which, as he conceives himself injured, and requests an enquiry into his conduct, your committee are of opinion that he ought to be heard, and

⁴³ This report is in the *Papers of the Continental Congress*, No. 147, I, folio 237.

⁴⁴ This report is in the *Papers of the Continental Congress*, No. 136, I, folio 305.

⁴⁵ This letter is in No. 78, XIX, folio 97.

⁴⁶ The letter of Morgan, in No. 63, folio 113; and the memorial in No. 41, VI, folio 19.

* Material placed in parenthesis appeared in brackets in the original MSS.

⁴⁵ This petition is in the *Papers of the Continental Congress*, No. 42, VIII, folio 167.

⁴⁶ This report is in the *Papers of the Continental Congress*, No. 19, IV, folio 177. It is summarized on August 9, post.

that a committee of Congress should be appointed for that purpose."

Resolved, That Congress concur in the said report.

The Medical Committee, to whom was referred the letter from Dr. William Rickman, also report, "that as the establishment of the military hospital in Virginia, by a resolution of Congress of the 18th of May, 1776, is entirely distinct from, and independent of, the general establishment of hospitals in the other States, they are of opinion, the same was not affected by the new regulations of the 7th day of April last, and that Dr. Rickman still continues director of that hospital;"

Resolved, That Congress concur with the foregoing report.⁴⁷

Ordered, That a copy of the foregoing report and concurrence of Congress be sent to Dr. Shippen, and that he be directed to withdraw from Virginia such physicians, surgeons, or assistants, as he may have sent thither.

August 25, 1777. 670

A letter, . . . of the 16, from Dr. Shippen, were read:⁴⁸

Ordered, That . . . the letter from Dr. Shippen, be referred to the Medical Committee.

August 30, 1777. 699

The Medical Committee brought in a report which was taken into consideration; Whereupon,

Resolved, That the several issuing commissaries be directed to furnish the director general, or any of the deputy directors, or their assistants, with such provisions as any of them shall, from time to time, demand by an order in writing, for the use of any temporary hospital which shall be established, which order, with the receipt of the steward endorsed thereon, shall be a sufficient voucher for such issuing commissary, who is also required to keep such vouchers separate, and make a separate entry of the same in his books, charging the director who ordered the same therewith.

September 10, 1777. 727, 728-9

A letter, . . . of the 9, from Dr. Shippen, director general of the hospital, . . .

Ordered, That the letter from Dr. Shippen, . . . be referred to the Board of Treasury.

That there is due to Dr. John Morgan, late director general of the American hospitals, the balance of his account current as adjusted by the commissioners of accounts at Hartford, the 12 July last, the sum of 613 40/90 dollars, and the farther sum of 200 dollars which he advanced to Dr. Warren, surgeon of the general hospital, to defray expences, &c. which sum was stolen from the said Warren, as per certificates taken on oath before the commissioners at Stamford, and which the Board of Treasury agrees should be allowed to Dr. Morgan;

Also the pay of director general from the 31 December, 1776, to the 12 July, 1777, being 194 days, at 6 dollars per day, which time he employed in taking accounts, and delivering up the medicines,

⁴⁷ See note under August 8, *ante*.

⁴⁸ The letter of Shippen, is in the *Papers of the Continental Congress*, No. 78, XX, folio 147.

⁴⁹ Words in parentheses were inserted by Henry Laurens.

hospital stores, &c. settling accounts with the surgeons, mates, &c. attending the commissioners at Hartford, 1,164 dollars; for 1,179 rations from 31 December, 1776, to 10 May, at 8/90 dollar, 104 72/90 dollars, and for 567 rations, from 10 May to 12 July, at 10/90, 63 dollars, making in the whole 2,145 22/90 dollars:

September 13, 1777. 739

Ordered, That the President issue his warrant on the commissioners of the loan office for the State of Pennsylvania, in favour of Dr. Shippen, director general of the hospital, for fifty thousand dollars, for the use of that department; and for which he shall be accountable:

September 18, 1777. 754

Resolved, That establishments be made for the hospital in the respective departments, and chaplains appointed, and that their pay be each 60 dollars a month, three rations a day, and forage for one horse:

The Rev. Mr. Noah Cook was elected chaplain of the hospitals in the eastern department.

October 18, 1777. 821

A letter from William Shippen, director general, to the Medical Committee, was laid before Congress and read:

Ordered, That it be referred to the Board of War.

October 20, 1777. 823

Resolved, That General R. Howe's letter of the 29 August last, relating to the general hospital in South Carolina, be referred to the Medical Committee.

October 24, 1777. 838

Resolved, That a warrant issue on the treasurer for 500 dollars, in favour of William Shippen, Jun^r director general of the hospital, which is to be charged to the said W. Shippen, and for which he is to be accountable; this being to indemnify the treasurer for so much advanced by him to the said Dr. Shippen on account of the military hospitals, as appears by his receipt, dated 15 October, 1777.

November 6, 1777. 870

Resolved, That the unremitted attention shewn by Dr. Potts, and the officers of the general hospital in the northern department, (as represented in General Gates's letter to Congress, of the 20 October,) ⁴⁹ to the sick and wounded under their care, is a proof not only of their humanity, but of their zeal for the service of the United States, so deeply interested in the preservation of the health and lives of the gallant asserters of their country's cause; and that Congress, therefore, cannot but ascertain a high sense of the services which they have rendered, during this campaign, by a diligent discharge of their respective functions.⁵⁰

November 12, 1777. 894

Ordered, That a warrant issue on Nathaniel Appleton, Esq^r commissioner of the continental loan office of the State of Massachusetts bay, in favour

⁵⁰ This report, dated November 4, is in the *Papers of the Continental Congress*, No. 147, I, folio 381. The members of the Board present were: Francis Lightfoot Lee, William Duer, Joseph Bones, William Williams and John Harvie.

of Dr. William Shippen, director general of the hospitals, for sixty-seven thousand dollars, for the use of his department, and for which he is to be accountable:

November 19, 1777. 941

The Medical Committee brought in a report, which was taken into consideration; Whereupon,

Resolved, That the cloathier general be directed to deliver to the director general of the military hospitals, the deputy directors general, or their assistants, for the use of the sick and wounded of the several departments, a proportionable share of the blankets, shirts, shoes, and stockings, he shall, from time to time, procure for the supply of the army:

That the director general of the hospitals be authorized to cause stoves to be erected in the different hospitals, in case he shall think such a measure will conduce to make up for the present scarcity of blankets and cloathing, or to the greater comfort of the sick; and that the waggons annexed to the hospital department be employed, as much as possible, in the transportation of fuel for the respective hospitals.

November 29, 1777. 980

A letter, of the 16, from General Gates, . . . also a letter of the 24, from W. Shippen, director general, at Bethlehem, were read:⁵¹

December 1, 1777. 983

Ordered, That a warrant issue on Thomas Smith, Esq^r commissioner of the loan office for the State of Pennsylvania, in favour of Dr. William Shippen, director general of the hospitals, for fifty thousand dollars, for the use of his department; the said director general to be accountable:

Ordered, That a warrant issue on the treasurer, in favour of Dr. William Shippen, director general of the hospitals, for fifty thousand dollars, for the use of his department, the said director general to be accountable:

December 10, 1777. 1016

Resolved, That two members be added to the Medical Committee:

The members chosen, Mr. (Francis) Lewis and Mr. (John) Penn.

Congress having received information that the inoculation of recruits in the hospital in the State of Virginia has of late been attended with much ill success;

Resolved, That the Medical Committee make strict enquiry into the truth of this information, and report to Congress, with all possible despatch.

December 13, 1777. 1024

A return of the number and names of the wounded men, distinguishing such as are fit for the corps of invalids, and such as are totally unfit for service;

December 20, 1777. 1039

The Medical Committee, to whom it was referred to enquire into the conduct of the director of the

hospitals at Alexandria, reported, "That from the information of several officers in the Virginia and North Carolina regiments, which are annexed, it appears obvious to the committee that Dr. Rickman, director of the said hospitals, has been guilty of great neglect in not giving proper attendance to the officers and soldiers under inoculation at Alexandria:" The said report and the informations being read,

Resolved, That Dr. Rickman be immediately suspended, and that he attend the Medical Committee, to answer the several complaints exhibited against him.

Ordered, That the Medical Committee transmit to Dr. Rickman a copy of the complaints against him, and direct his attendance:

That the said committee write to Dr. Shippen, director general, and direct him to send immediately a skilful physician to take care of the sick and superintend the inoculation of the soldiers at Alexandria.

January 1, 1778. p. 9

A letter, of the 8, and one, of the 13 December, from Dr. B. Rush to Mr. (William) Duer, were laid before Congress, and read:⁵²

Resolved, That the said committee be fully authorized to take every measure, which they shall deem necessary, for the immediate relief of the sick, and report such alterations in the medical department, as they shall deem best adapted to answer the end of its institution.

January 6, 1778. p. 23, 24

The committee to whom the letters from Governor Livingston and Dr. Rush were referred, brought in a report, which was taken into consideration; Whereupon,

Resolved, That the cloathier general be directed to deliver to the order of the director general as much linen and as many blankets as can be spared, to be retained in the hospital for the use of the sick:

That the cloathier general be directed to supply the convalescents with necessary cloathing, in order that, when properly recovered, they may join the army:

That a member of Congress be forthwith appointed to visit the hospitals in the middle department: the member chosen, Mr. (John) Penn.

That a recommendation be sent to the clergy of all denominations in the said [middle] district, to solicit charitable donations of woollens and linen, made or unmade, for the sick soldiers in the hospitals; and to send the same to the Board of War, or any hospital, as may be most convenient.

That Dr. Shippen and Dr. Rush be directed to attend Congress on the 26 day of January inst. to be examined touching certain abuses said to prevail in the hospital.

Resolved, That the farther consideration of the report be postponed (to the afternoon.) . . .

Congress resumed the consideration of the report under debate this morning; Whereupon,

⁵¹ The letter of Shippen is in the *Papers of the Continental Congress*, No. 78, XX, folio 163.

⁵² These letters are in the *Papers of the Continental Congress*, No. 78, XIX, folios 173 and 181.

Resolved, That the sum of ten dollars shall be paid by every officer, and the sum of four dollars by every soldier, who shall enter, or be sent into any hospital to be cured of the venereal disease; which sums shall be deducted out of their pay, and an account thereof shall be transmitted by the physician or surgeon who shall have attended them, to the regimental pay master for that purpose; the money so arising to be paid to the director general, or his order, to be appropriated to the purchasing blankets and shirts for the use of sick soldiers in the hospital.

January 19, 1778. 60

A letter, of the 18th, from W. Shippen, Jun, . . . was read: . . .⁵³

January 26, 1778. 92

A letter, of the 25, from Dr. Rush, was read: . . .⁵⁴

January 27, 1778. 93

A letter from Dr. Shippen, director general of the hospital, and one from Dr. Brown, (both directed) to the Medical Committee, were laid before Congress, (and read):⁵⁵

Ordered, That the same, together with the letters some time since received from Dr. Shippen and Dr. Rush, and Governor Livingston, relative to the hospital department, be referred to a committee of five, and that the committee be instructed to confer with Dr. Shippen and Dr. Rush, and report specially:

January 30, 1778. 100

Resolved, That a warrant issue on the treasurer in favour of Dr. Jonathan Potts, deputy director general of the hospitals in the northern department, for twenty thousand dollars for the use of his district; the said deputy director general to be accountable.

A letter, of this day, from Dr. Rush, requesting leave to resign, was read:⁵⁶

February 6, 1778. 128-131

Congress took into consideration the report of the committee to whom the letters from Dr. Shippen, Dr. Rush, and others were committed; and thereupon came to the following resolutions:

For the better regulating the hospitals of the United States,

Resolved, That there be a deputy director general for the hospitals between Hudson and Potomack rivers; and that the superintending care of the director general be extended equally over the hospitals in every district, and that he be excused from the duty of providing supplies, [and from "particularly" superintending the said hospitals]* when the deputy director general shall be ready to enter upon the office:

That the several officers of the hospitals shall cease to exercise such of their former powers as are herein assigned to other officers thereof:

That in the absence of the director general from any district, the physician general and surgeon general shall hereafter determine the number of hospitals to be provided by the deputy director general for the sick and wounded, and shall superintend and controul the affairs of such hospitals:

That the director general shall consult with the physician general and surgeon general in each district, about the supplies necessary for the hospitals, and shall give orders in writing to the deputy director general thereof to provide the same; and, in the absence of the director general, the physician general and surgeon general shall issue such orders:

That each deputy director general shall appoint one or more of the assistant deputy directors, under him, to the sole business of providing beds, furniture, utensils, hospital clothing, and such like articles; and shall appoint one or more to provide medicines, instruments, dressings, herbs, and necessaries of a similar kind:

That the director general shall frequently visit the hospitals in each district, and see that the regulations are carried into effect; shall examine into the number and qualifications of the hospital officers, report to Congress any abuses that may have taken place, and discharge the supernumerary officers, if there be any, that all unnecessary expence may be saved to the public; and when the director general is in any particular district, the physician general and surgeon general in that district shall not appoint any officers without his consent:

That, on the settlement of hospital accounts, the officers entrusted with public money shall produce vouchers to prove the expenditure, and receipts from the proper officers of the hospitals, specifying the delivery of the stores and other articles purchased; and the apothecaries, mates, stewards, matrons, and other officers, receiving such stores and other articles, shall be accountable for the same, and shall produce vouchers for the delivery thereof from such officers, and according to such forms as the physicians general and surgeons general have directed, or shall, from time to time, direct; which forms and directions the physicians and surgeons general shall report to the Board of Treasury:

That the director general, or, in his absence from the district, the physician general, and surgeon general, shall appoint a ward master for each hospital, to receive the arms, accoutrements and clothing of each soldier admitted therein, keeping entries of, and giving receipts for such articles, which, on the recovery of the soldier, shall be returned to him, or, in case of his death, the arms and accoutrements shall be delivered to the commissary or deputy commissary of military stores, and receipts be taken for the same; and the ward master shall receive and be accountable for the hospital clothing; and perform such other services as the physician general or the surgeon general shall direct:

That the physicians general and surgeons general shall hereafter make no returns to the deputy direc-

⁵³ The letter of Shippen is in the *Papers of the Continental Congress*, No. 78, XX, folio 171.

⁵⁴ The letter of Dr. Rush is in the *Papers of the Continental Congress*, No. 78, XIX, folio 197.

⁵⁵ This letter is in the *Papers of the Continental Congress*, No.

78, XX, folio 175.

⁵⁶ This letter is in the *Papers of the Continental Congress*, No. 78, XIX, folio 205.

* Material in brackets was cancelled in the original MSS.

tors general, but the returns shall be made by the said officers respectively to the director general, who shall carefully transmit copies of each with his monthly return to Congress, and suspend such of the officers aforesaid as neglect this or any other part of their duty, and shall report their names to Congress:

That the director and deputy directors general forthwith prepare their accounts, and adjust them with the commissioners of claims, at the Board of Treasury.

That four dollars a day, and the former allowance of rations, be hereafter allowed to each assistant deputy director and the commissary of the hospitals in each district; and one dollar a day, and two rations, to each ward master:

Resolved, That Dr. Potts be called from the northern district, and appointed to act as deputy director general in the middle district.

Resolved, That the eldest assistant deputy director in the northern district shall execute the office of the deputy director general in the said district, until the further orders of Congress:

That the salaries of the hospital officers and debts contracted for the hospitals of the middle district to the time of Dr. Potts's entering upon the office of deputy director general therein, shall be adjusted and paid by the director general, who shall deliver all the public stores in his possession to the deputy director general or his order, taking duplicate receipts for the same, and transmitting one of each to the Board of Treasury; and the same rule shall be observed by Dr. Potts with respect to the salaries and debts of the hospitals of the northern district, and the public stores thereof, which are to be delivered to his successor in office in that district.

Congress proceeded to the election of a physician general in the middle district, in the room of Dr. Rush, [resigned] and the ballots being taken,

Dr. William Brown was elected.

February 10, 1778. p. 142

Resolved, That another chaplain be chosen for the hospitals in the middle department:

The ballots being taken, the Rev. Mr. (James) Sprout was elected.

February 13, 1778. p. 157, 158

That there is due to Dr. John Witherspoon, for hay for the army, and wood for the hospital at Princeton, as appears by the certificate of Enos Kelsey, acting in the quarter master's department, the sum of 429 30/90 dollars:

Resolved, That Mr. Nathaniel Scudder be added to the Medical Committee,

February 21, 1778. p. 186, 187

A letter of 21, from Dr. W. Shippen, was read;⁵⁷ Whereupon,

Resolved, That a surgeon general be appointed for the hospital in the middle department, in the room of Dr. Brown, promoted; the ballots being taken,

⁵⁷ This letter is in the *Papers of the Continental Congress*, No. 78, XX, folio 193.

⁵⁸ This report is in the *Papers of the Continental Congress*, No. 136, II, folio 101.

Dr. Charles M'Knight was elected.

Whereas, the duty of the person who executes the office of secretary and pay master of the hospital in the middle department, is important and difficult:

Resolved, That the pay of the person who executes those offices in the hospital in the middle department, be augmented to three dollars a day.

That a warrant issue on the treasurer for the sum of forty thousand dollars, in favour of William Shippen, Jun. director general of all the military hospitals, for the use of the middle district; for which the director is to be accountable:

February 23, 1778. p. 191

That a warrant issue on the treasurer in favour of Dr. Jonathan Potts . . . for one hundred thousand dollars . . . he is to be accountable.⁵⁸

March 7, 1778. p. 230

The Medical Committee report, "That they have carefully examined and considered the several allegations and testimonies for, and against, Dr. William Rickman, deputy director general in the southern department; that, notwithstanding, it appears the North Carolina and Virginia troops, inoculated by the said Dr. Rickman at Alexandria, suffered, in general, more in the course of the disease than is usual, and that a number of them did die; yet, as the committee are convinced that it was impracticable for the director to obtain, in season, a variety of articles for their due accommodation in the hospitals, as many of them were badly clothed, and all had, immediately before the operation, undergone a long and fatiguing march at a season of the year when putrid diseases generally prevail most; as from a regular return it appears that most of those who were lost, died of a putrid fever; as the director really had not sufficient assistance, and lastly, as one of the assistants, of the name of Parker, who was employed from the necessity of the case, appears to have greatly abused the confidence and trust reposed in him by the director; whence a great part of the evils complained of by the patients may have arisen; the committee are of opinion, that Dr. Rickman ought to be acquitted of the charges exhibited against him; that the resolution of the 20th day of December last, for his suspension, be repealed, and that Dr. Rickman be directed to repair immediately to his department, and resume the exercise of his duty there:"⁵⁹

March 9, 1778. 235

A letter, of the 2, from Captain W. Nichols, was read, praying for leave to resign his commission.

. . . A letter from Dr. A(mm) R(uhamah) Cutter to Mr. (George) Frost, praying for leave to resign, were read:⁶⁰

Ordered, That Dr. Cutter have leave to resign; that the letter from Captain Nichols be referred to the Board of War; . . .

March 11, 1778. 243

That a warrant issue on the treasurer, in favour of Joseph Nourse, pay master to the Board of War

⁵⁹ This report, in the writing of Nathan Brownson (?), is in the *Papers of the Continental Congress*, No. 19, V, folio 249.

⁶⁰ The letter of Nichols is in the *Papers of the Continental Congress*, No. 78, XVII, folio 37.

and ordnance, for 50,000 dollars, to be by him transmitted to Doct. Isaac Forster, deputy director general of the military hospital in the eastern department, at Danbury, in Connecticut, for which the said doctor is to be accountable:

March 26, 1778. 284

A letter, of the 24 February, from the council of Massachusetts bay, respecting allowances to be made to sick and wounded soldiers, was read.⁶¹

April 3, 1778. p. 303

A letter, of 21 March, from General Washington, enclosing a copy of a letter to him from Dr. Rush, dated Princeton, 25 February, was read; also a letter of 9 March, with a postscript of 19, from Dr. Rush to Mr. (Daniel) Roberdeau, was laid before Congress:⁶²

April 17, 1778. p. 361

That 30,000 dollars be advanced to Dr. Potts, and that a warrant issue in his favour on Thomas Smith, Esq. commissioner of the continental loan office in the State of Pennsylvania, for the farther sum of 70,000 dollars, for the use of the hospital in the middle district; for which sums the said Dr. Potts is to be accountable:

April 18, 1778. p. 365, 366

Resolved, That a Warrant issue on the Treasurer On question, in favour of Dr. William Shippen, . . . **negatived** for Forty thousand Dollars, . . . for which he is to be accountable.

Resolved, That Mr. G(ouverneur) Morris be added to the Medical Committee.

May 16, 1778. p. 504

Ordered, That 100,000 dollars to be paid to Dr. Thomas Bond, Jun. to be by him delivered to Dr. Jonathan Potts, deputy director general, for the use of the hospitals of the middle district; the said Dr. J. Potts to be accountable:

May 23, 1778. p. 525, 526, 527

. . . The Board will lay before Congress the facts which they have collected from Major Wilson, commanding at Carlisle during the residence of Major Stockton and other officers of his party in the goal of that place; from M^r. T. Peters, Deputy Commissary of prisoners, who has had the charge during the winter of the prisoners at Carlisle and York; from Doctor Henry, employed to attend the British prisoners when sick; . . .

. . . But the goal at Carlisle not being secure, the deputy Commissary of prisoners removed them to the prison of this place, wherein was also confined Doctor John Conolly, for the same causes which induced and continued their present imprisonment, and for other reasons of policy and prudence. Doctor Conolly having also sundry times behaved amiss while on parole.

⁶¹ This letter is in the *Papers of the Continental Congress*, No. 65, I, folio 288. It is indorsed: "There are no resolutions of Congress respecting soldiers in any of the circumstances mentioned in this letter."

⁶² The letter of Washington is in the *Papers of the Continental Congress*, No. 152, V, folio 411; that of Rush to Washington is in No. 78, XIX, folio 211, and that of Rush to Roberdeau, in the same volume, folio 215.

. . . There was some time ago an apprehension in a part of the goal distant from the officers' apartments that a contagious fever had broke out among the soldiers, but the diseased were immediately removed to hospitals, and a Surgeon and nurses provided for them, and every assistance afforded them the nature of our affairs would admit. . . .

M^r. Conolly, altho' indulged with every thing a prisoner could reasonably wish, has repeatedly represented his own, and the situation of the goal, in similar terms with the letter now under consideration, and the former, and this Board, have often had consequent examinations, in all of which they found the complaints groundless. Once particularly, when M^r. Conolly represented himself as at the point of death from the severity of his confinement, the board directed Doctor Shippen to visit him, who reported that his situation was directly opposite to his representation, his indisposition slight and merely of an Hippochondriac Nature. . . .

RICHARD PETERS.⁶³

May 25, 1778. p. 531

Resolved, That the auditor, together with Mr. Milligan, one of the commissioners of claims, be authorized and directed to examine and pass upon the accounts of Dr. Isaac Forster, deputy director general of the eastern department.

May 28, 1778. p. 546

That 755 42/90 dollars be advanced to the Committee of Commerce, to enable them to pay Andrew and James Caldwell the freight of sundry medicines imported in their sloop from Martinico, on public account; the said Committee to be accountable.⁶⁴

June 4, 1778. p. 568

A letter, of 20 April, from Dr. Rush to Messrs. (William Henry) Drayton, (Samuel) Huntington, and (John) Banister, committee appointed on 3d of that month to inquire into Dr. Rush's charge against Dr. Shippen, (was read):⁶⁵

June 9, 1778. p. 580, 582

Ordered, That 50,000 dollars be advanced to Dr. Isaac Forster, . . . for the use of his department; and for which he is to be accountable. . . .

Resolved, That the deputy director general of the hospital in the eastern department shall, as heretofore, in the absence of the director general, superintend the medical affairs of that department till the further order of Congress.

June 10, 1778. p. 582

Ordered, That 200,000 dollars be advanced to Dr. Jonathan Potts, deputy director general for the middle district, for the use of his department; he to be accountable.

N. B. Dr. Potts applies for 300,000 Dollars; but as he has already had that sum advanced him since February last, and as the Treasury is at present very low, your Committee judged it improper to report so large a sum. They beg leave further to inform Congress, that from an examination of the

⁶³ This report is in the *Papers of the Continental Congress*, No. 147, II folio 57.

⁶⁴ This report is in the *Papers of the Continental Congress*, No. 136, II, folio 321.

⁶⁵ This letter is in the *Papers of the Continental Congress*, No. 78, XIX, folio 233.

estimates given them by Dr. Potts, they conceive the expences that accrue in his Department are exorbitant; they have therefore laid them before Congress for their Inspection.⁶⁶

June 15, 1778. p. 607

The auditor general and commissioners of claims having, in consequence of the resolution of the 25 May, reported upon the accounts of Dr. Forster,

Ordered, That it be referred to the Board of Treasury, and that the accounts of Dr. Forster be adjusted agreeably to the said report, when he shall produce vouchers shewing the expenditure of the stores by him procured and charged in the said account.

July 13, 1778. p. 686

The Committee for Foreign Affairs laid before Congress a letter from Dr. Edward Bancroft, dated 31 March last which was read, and returned to the Committee.

August 4, 1778. p. 746

Ordered, That a warrant issue on the treasurer for one hundred thousand dollars, in favour of Jonathan Potts, Esq., . . . he to be accountable.

August 11, 1778. 775

That a warrant issue on the treasurer in favour of Dr. Isaac Forster, . . . for the use of his department, . . . he to be accountable; and that the same be paid to John Delamater, as requested by the doctor.

August 14, 1778. 787

A letter, of the 1 August, from Mr. (Samuel) Huntington, one of the delegates of that State in Congress, was laid before Congress, and read, setting forth sundry evils and abuses in the hospitals in the eastern district: Whereupon,⁶⁷

Resolved, That the resolution of Congress of the 9 of June last, authorizing the deputy director general of the hospital in the eastern department, in the absence of the director general, to superintend the medical affairs of that department, be, and it is hereby repealed; and that the said hospital for the future be under the same regulations as the hospitals in the other departments.

Resolved, That the director general be directed to enquire into the state of the hospital in the eastern department, and give proper orders for the good government and economy thereof, and discharge unqualified and supernumerary officers, if any there be.

August 20, 1778. 816

A letter, of 19, from Major General Arnold, was read:

Ordered, That it be referred to the Board of War, and that the Board be directed to report their opinion on the necessity of an additional number of troops to the corps of invalids, for the purpose of

⁶⁶ This report is in the *Papers of the Continental Congress*, No. 136, II, folio 349.

⁶⁷ The letter of Huntington is in the *Papers of the Continental Congress*, No. 78, XI, folio 309.

⁶⁸ This report, dated August 20, is in the *Papers of the Continental Congress*, No. 136, II, folio 471.

guards in the city of Philadelphia; and if an additional number is, in their opinion, necessary, how many and for what purposes.

August 21, 1778. p. 825

That there is due to the officers and privates of the invalid regiment, for pay and subsistence for the months of May and June last, the sum of 937 54/90 dollars:⁶⁸

Ordered, That the said accounts be paid.

September 3, 1778. p. 863

That a warrant issue on the treasurer in favour of Dr. Jonathan Potts, deputy director general for the middle district, for 70,000 dollars, of which 40,000 is for the use of the hospitals thereof, and 30,000 to be transmitted to Dr. Johnston, assistant director of the northern department; the said Dr. Potts to be accountable:

September 7, 1778. p. 887

A letter, of 28 August, from Dr. (I.) Forster, deputy director general of the hospital in the eastern department, was read:

Ordered, That it be referred to the Medical Committee.

September 16, 1778. p. 918

That Dr. John Warren, Executor of the late Major General Warren be authorized and requested to superintend their Education, and to make quarterly Drafts on the Treasury of the United States for the Expences incident to the same, transmitting to the Board the necessary Accounts.

September 18, 1778. 925

A letter and memorial from Dr. J. Morgan, were read:⁶⁹

Ordered, That the foregoing letter and memorial be referred to the said committee.

September 23, 1778. 946

Resolved, That Mr. (Samuel) Holton be added to the Medical Committee.

October 9, 1778. p. 993

That there is due to the officers and privates of the invalid regiment, commanded by Colonel L. Nicola, for pay and subsistence for the month of August last, the sum of 1558 25/90 dollars:

October 10, 1778. 997

A letter, of 4, from Dr. W. Shippen, director general, enclosing a return of the sick in the hospital, was read:

Ordered, That the same be referred to the Medical Committee.

October 20, 1778. 1031

Whereas by a resolution of Congress of the 22 April, 1777, it is provided, that the several commanding officers of parties, detachments or corps on their march to or from the camp, shall send to the military hospitals such of their officers and soldiers as from time to time, are unable to proceed, unless from the distance of the hospitals or other causes,

⁶⁹ This position, dated September 17, is in the *Papers of the Continental Congress*, No. 41, VI, folio 51. The letter is in No. 63, folio 117.

it shall at any time be necessary to deliver them to the care of private physicians or surgeons, in which cases the deputy director general shall discharge the reasonable demands of the physicians and surgeons conducting, agreeably to the said resolve.

And, whereas, no provision is therein made for discharging the accounts of other persons who have been or may be employed by proper officers for taking care of and providing for such officers and soldiers:

Resolved, That the deputy directors general be respectively authorized and instructed to discharge some of the said accounts as shall appear to be reasonable and just, provided that each person who may hereafter be employed to provide for officers and soldiers as aforesaid, shall give the earliest notice thereof to the deputy director general, or the physician or surgeon general of the district, in order for their speedy removal to the military hospitals.

October 22, 1778. p. 1038

A memorial from the regimental surgeons and surgeons' assistants of the Army or the United States of America, was read:

Ordered, That it be referred to a committee of three:

The members chosen, Mr. (Nathaniel) Scudder, Mr. (Samuel) Holton, and Mr. (Josiah) Bartlett.

October 26, 1778. p. 1062, 1064.

A letter, of 21, from Major General Lord Stirling, enclosing a letter to him from Dr. Griffith, with sundry affidavits relative to the massacre of Colonel Bayler's regiment, on 27 September last, was read:

Ordered, That Mr. (Josiah) Bartlett be added to the Medical Committee:

October 30, 1778. p. 1079

That there is due to the officers and privates of Colonel Lewis Nicola's regiment of invalids, for rations and parts of rations retained from their first establishment to the 31 of May, 1778, a balance of six hundred and eighty-eight 50/90 dollars, as more fully appears by a particular state filed with the accounts:

November 3, 1778. p. 1101

That a warrant issue on Thomas Smith, commissioner of the continental loan office in the State of Pennsylvania, in favour of Jonathan Potts, deputy director general, for one hundred and thirty thousand dollars, for the use of his department; he to be accountable.⁷⁰

A motion being made respecting the medical department,

Ordered, That it be referred to the Medical Committee.

November 9, 1778. p. 1113

An extract from the journals of the assembly of South Carolina, purporting to be "a report of the committee on the president's message, relative to the hospital establishment and military arrange-

ments of this State, as agreed to by the House," was laid before Congress:

Ordered, That so much thereof as relates to the hospital, be referred to the Medical Committee, and the remainder to the Board of War.

November 12, 1778. p. 1124

Ordered, That a warrant issue on the treasury for seventy-five thousand dollars, in favour of Jonathan Potts, deputy director general, and another warrant in his favour on Derick Ten Broek, Esq. commissioner of the continental loan office in the State of New York, for seventy-five thousand dollars, . . . for use in hospitals in the northern department; . . . said deputy director general is to be accountable.

November 28, 1778. p. 1170, 1174

That another warrant issue on the treasurer in favour of Isaac Forster, Esq., . . . for twenty-five thousand dollars, to be paid to James Davison, . . . said deputy director general to be accountable: . . .

A memorial from the magistrates and the overseers of the poor of the city of Philadelphia, was read, praying for a compensation for the use of the house of employment, occupied for continental hospital.⁷¹

Ordered, To lie on the table.

December 5, 1778. p. 1192

The committee to whom was referred the memorial of the regimental surgeons and assistants, brought in a report, which was read, and after debate,

Ordered, That it be committed to the Medical Committee, who are directed to take into consideration the case of the hospital as well as regimental surgeons, and report thereon.

December 28, 1778. p. 1259

Resolved, That a member in the place of Mr. (John) Harvie be added to the committee on the memorial from Dr. Morgan:

The member chosen, Mr. M(eriwether) Smith.

February 6, 1778. p. 1282

Resolutions on Hospitals.

199. Rules and directions / for the better regulating the Military Hospital of the United States: / In consequence of a Resolve of the Honourable the Continental Congress, the 6th of / February, 1778; to be punctually observed by the Officers, Nurses, &c. of the / Eastern Department.^{71a}

(Signed) P. Turner, Surg. Gen. M. H. E. D.
F^o Broadside.

September 25, 1778. p. 1287

Provision for disabled officers and privates.

226. In Congress, August 26, 1776 . . . In Congress September 25, 1778 . . .^{71b}

December 3, 1778. p. 1289

Health of Soldiers.

⁷⁰ This report is in the *Papers of the Continental Congress*, No. 136, II, folio 665.

⁷¹ This memorial, dated November 18, is in the *Papers of the Continental Congress*, No. 41, VI, folio 73.

^{71a} A copy is in the Library of Congress. *Papers of the Continental Congress*, No. 78, xxii, folio 567. It measures 40 x 25 cms.

^{71b} See *Pennsylvania Archives*, vi, 755.

235. Directions / For Preserving / The Health of / Soldiers: / recommended to / The Consideration of the / Officers / Of the Army of the United / States. / By Benjamin Rush, M. D. / Published by Order of the Board / of War. / Lancaster: Printed by John Dunlap, / In Queen-Street. / M.DCC.LXX-VIII. 12^o pp. 8.

January 12, 1779. 51

A letter, of 10, from Doctor Shippen, Director General, was read:

Ordered, That it be referred to the Medical Committee.

Ordered, That two members be added to the said committee.

The members chosen, Mr. (Thomas) Burke and Mr. T(homas) Adams.

January 16, 1779. 73

That a warrant issue on the treasurer, in favour of Nathaniel Eustis, upon the application of Doctor Isaac Forster, deputy director general of the eastern district, agreeable to his letter of the 28 December last, for twenty-five thousand dollars; and

That another warrant issue on Nathaniel Appleton, Esq. commissioner of the continental loan office, in the State of Massachusetts bay, in favour of the said Doctor Isaac Forster, for fifty thousand dollars; . . . said deputy director general is to be accountable; . . . for the use of his department.

January 23, 1779. 110-111

Resolved, That the director general (of the medical department) be authorized and instructed to enjoin the several deputy directors, physicians, and surgeons general and other officers under his superintendence, to attend and perform such duties at any post or place, as a change of the position of the army, or other circumstances, may, from time to time, make necessary, and shall be required by the Commander in Chief, notwithstanding such deputy director, physician, or surgeon is, by the general arrangement of the hospitals, attached to a particular department; and that in case of any dispute concerning their seniority or precedence, the director general shall determine the same in the first instance, the party supposing himself aggrieved being at liberty to appeal for redress to the Medical Committee.

Resolved, That the director general be authorized and instructed to supply, for the use of the regimental surgeons, such medicines and refreshments as may be proper for the relief of the sick and wounded before their removal to a general hospital, and to be dispensed under the care and at the discretion of the physician and surgeon general of the army.⁷²

February 8, 1779. 151

A memorial from W. Shippen, director general, in behalf of himself and the medical officers of the general hospital in the middle, eastern and northern districts, was read:

Ordered, That it be referred to the Medical Committee.

February 26, 1779. 255

That agreeable to the application of the Medical Committee a warrant issue on the treasurer, in favour of Doctor Jonathan Potts, *** for one hundred and fifty thousand dollars, *** he to be accountable.

March 6, 1779. 287

Resolved, That a warrant issue on the treasurer, in favour of Dr. Jonathan Potts, *** on the application of the Medical Committee, for one hundred and fifty thousand dollars, . . . for which he is to be accountable.

March 10, 1779. 301

That a warrant issue on the treasurer in favour of Doctor Jonathan Potts, . . . for one hundred and fifty thousand dollars, . . . he is to be accountable.

March 13, 1779. 313

The committee, to whom was referred the memorial of Doctor J. Morgan, late director general and physician in chief in the general hospital of the United States, brought in a report, which was read:⁷³

Ordered, To lie on the table for the perusal of the members, to be taken into consideration on Thursday next.

April 12, 1779. 440

That John Nixon Esqr. Col. Shee, Andrew Doz have been recommended by Francis Hopkinson Esq. Treasurer of Loans; Hugh Montgomery by Doctor Witherspoon, and John Miller Esq. by Doctor Ewing, as proper persons to be appointed Commissioners for destroying the Bills to be taken out of circulation.

April 15, 1779. 455

A memorial from the staff officers of the general hospital was read:

Ordered, That it be referred to the Medical Committee.

April 16, 1779. 460

That a warrant issue on the treasurer, in favour of Doctor Jonathan Potts, deputy director general of the military hospitals for the middle department, upon the application of the Medical Committee, for one million of dollars, for the use of his department, and for which he is to be accountable.

April 27, 1779. 515, 523-524

That a warrant issue on the treasurer, in favour of Isaac Forster, Esq. *** for one hundred thousand dollars, to be paid agreeable to his request to John Adams, *** the said Doctor Forster to be accountable.⁷⁴

The Committee on the Treasury report,

That information has been given to the Board of Treasury that Alexander McKallagher, the deputy commissary of the hospital at the Yellow Springs, has made a practice of exchanging the hospital stores, such as sugar, molasses, &c. for butter, poultry, eggs,

⁷² This report, in the writing of James Duane, is in the *Papers of the Continental Congress*, No. 33, folio 277.

⁷³ See under June 12, "post."

⁷⁴ Based upon Forster's letters of March 9 and 10, 1779.

&c. for his own and the doctors' table: That he keep a blooded horse in the guard house, and a mare and colt; and a hostler at his quarters, and another at the hospital, that he entertains all people who come to the hospitals with wine and toddy, alledging that he is allowed to do so by Congress or Doctor Shippen, the informant is not certain which.

That those circumstances have given occasion to great clamours among the inhabitants in the neighbourhood.

That it is convalescent hospital: That they have repaired the Farmer's houses in the neighbourhood for their own convenience at the public expence; Whereupon,

Ordered, That the information from the Committee on the Treasury, relative to Alexander McKallagher be referred to the Medical Committee, and that they take such measures for ascertaining the facts; and if properly supported for bringing him to a tryal, as they shall judge expedient.⁷⁵

May 5, 1779. 549

That a warrant issue on the treasurer, in favour of Doctor George Smith, for the sum of thirteen hundred seventy six dollars 22/90, equal to five hundred and fifty pounds ten shillings, New York currency, reported by John Welles and Edward Chinn, Esquires, commissioners of accounts, at Albany, to be due to him for cattle and forage taken by order of General Schuyler for the immediate subsistence of the militia and other troops assembled at Fort Edwards on the evacuation of Ticonderoga, his demand of recompence for the loss of fencing being rejected.⁷⁶

May 17, 1779. 599

Resolved, That a warrant issue on the treasurer in favour of John Gibson, auditor general, for fourteen thousand dollars, being the sum he so paid to the said Scott, on the order of the said Nathan Brownson, on the 1 September, 1777, on account of the State of Georgia, and for which the said State is to be accountable.⁷⁷

May 28, 1779. 661

A petition from Isaac Forster and others, officers of the hospital in the eastern department, was read: *Ordered*, That it be referred to the Medical Committee.

June 5, 1779. 689

A letter, of this day, from John Morgan was read;⁷⁸ Whereupon,

Resolved, That Saturday next be assigned for considering the report of the committee on the memorial of Doctor J. Morgan.

⁷⁵ The committee's recommendation was that "an enquiry ought to be made into the truth of the said charges, without delay; and that on proof thereof the parties charged ought to be suspended and brought to trial." The resolution adopted was an amendment offered by Elbridge Gerry, to be found in his writing on folio 259 l. 2. The name is written McKallaster in the Journals, and McKallagher in the committee report.

⁷⁶ This report, dated May 3, is in the *Papers of the Continental Congress*, No. 136, III, folio 287.

⁷⁷ This report, dated May 17, is in the *Papers of the Continental*

June 12, 1779. 722, 723, 724

That upon the application of the Medical Committee, a warrant issue on the treasurer, in favour of Doctor Isaac Forster, deputy director general of the eastern department, for one hundred and fifty thousand dollars, . . . he is to be accountable.

That there is due to the officers and privates of Colonel Lewis Nicola's invalid regiment, their pay and subsistence for the month of April last, two thousand three hundred and seventy three dollars and 6 90ths.

Congress took into consideration the report of the committee to whom was referred the memorial of Doctor John Morgan, late director general and physician in chief of the general hospitals of the United States, and thereupon came to the following resolution:

Whereas by the report of the Medical Committee, confirmed by Congress on the 9th of August, 1777, it appeared that Dr. John Morgan, late director general and chief physician of the general hospitals of the United States, had been removed from office on the 9th of January, 1777, by reason of the general complaint of persons of all ranks in the army, and the critical state of affairs at that time; and that the said Dr. John Morgan requesting an inquiry into his conduct, it was thought proper that a committee of Congress should be appointed for that purpose: and, whereas, on the 18th day of September last, such a committee was appointed, before whom the said Dr. John Morgan hath in the most satisfactory manner vindicated his conduct in every respect as director general and physician in chief, upon the testimony of the Commander in Chief, general officers, officers in the general hospital department, and other officers in the army, shewing that the said director general did conduct himself ably and faithfully in the discharge of the duties of his office: therefore,

Resolved, That Congress are satisfied with the conduct of Dr. John Morgan while acting as director general and physician in chief in the general hospitals of the United States; and that this resolution be published.⁷⁹

June 15, 1779. 733

A letter, of this day, from Dr. J. Morgan, was read, charging Dr. William Shippen, Jun. in the service of the United States, with mal-practices, and misconduct in office, and declaring his readiness to give before the proper court having jurisdiction, the necessary evidence in the premises against the said Dr. William Shippen.⁸⁰

On motion of Mr. (Henry) Laurens, seconded by Mr. (William Henry) Drayton,

Congress, No. 136, III, folio 313. The account with the State of Georgia is on folio 317.

⁷⁸ This letter is in the *Papers of the Continental Congress*, No. 63, folio 125.

⁷⁹ This report, in the writing of William Henry Drayton, is in the *Papers of the Continental Congress*, No. 19, IV, folio 185. It was presented March 13, 1779, Morgan's "Vindication," dated February 1, 1779, is in No. 63, folio 184.

⁸⁰ This letter is in the *Papers of the Continental Congress*, No. 63, folio 129.

Resolved, That a copy of the said letter be transmitted to the Commander in Chief, and that he be directed to cause such proceedings to be had thereon, as that the charges alluded to in it be speedily enquired into, and justice done.

Ordered, That an extract of the letter, with the above resolution, be transmitted to Dr. Shippen.

June 21, 1779. 754

A petition from the surgeons of the American navy was read:

Ordered, That it be referred to the Marine Committee.

June 29, 1779. 782

That a warrant issue on the treasurer, in favour of Doctor John Warren, for seventeen hundred and forty three dollars and 60/90, in full of his account for the support and education of Joseph Warren, son of the late Major General Warren, to April, 1779, as allowed by the council of Massachusetts bay, and that the said sum be paid to David H. Conyngham authorised to receive the same.⁸¹

July 19, 1779. 854

A letter, of 19, from John Morgan was read, enclosing sundry papers relative to his charges against Doctor Shippen:⁸²

Ordered, That copies thereof be sent to General Washington.

August 3, 1779. 917

A letter, of 28 July, from Doctor W. Shippen, was read;⁸³ Whereupon,

The Medical Committee, to whom were referred the several papers and memorials from the officers of the Medical department, brought in a report, which was read:

Ordered, That the same be taken into consideration, when the report from the committee on a farther allowance to the officers of the army is considered.

August 18, 1779. 978

Resolved, That until the further order of Congress, the said officers be entitled to receive monthly for their subsistence money, the sums following, to wit, . . . ensign and surgeon's mate 100 dollars.

September 3, 1779. 1018

A letter, of 2d, from the hon^{ble} Sr. Gerard, was read, soliciting leave for Mr. Witherspoon, a surgeon in the service of the United States to go to France:

Ordered, That it be referred to the Medical Committee.

Resolved, That two members be added to the said committee.

The members chosen, Mr. (Nathaniel) Peabody, and Mr. (Frederick A.) Muhlenberg.

September 29, 1779. 1123

That on the application of the Medical Committee, a warrant issue on the treasurer, in favour of Doctor Jonathan Potts, . . . for one hundred and

fifty thousand dollars, for the purchase of hospital stores, and for defraying the necessary expences of his department, and that another warrant issue on Thomas Smith, Esq. commissioner of the continental loan office, for the State of Pennsylvania, in favour of the said Doctor Jonathan Potts, for seventy one thousand one hundred and forty four dollars, in loan office certificates [for the purpose of discharging a debt due to Robert Morris, Esq. for twelve boxes of surgical instruments purchased of him by the said Dr. Potts;] the said Doctor Potts to be accountable

October 19, 1779. 1187

Resolved, That Friday next be assigned for taking into consideration the report of the Medical Committee on the medical staff.

October 22, 1779. 1200-1

Congress took into consideration the report of the Medical Committee on the medical staff, and some time being spent thereon,

Ordered, That the farther consideration thereof be postponed.

October 25, 1779. 1208

A letter, of this day, from Doctor John Morgan, was read:⁸⁴

Ordered, That it be referred to a committee of three:

October 27, 1779. 1211

Sundry returns of the state of the hospital in the southern department, were laid before Congress and read:

Ordered, That they be referred to the Medical Committee.

October 27, 1779. 1213-14

According to order, Congress took into consideration the report of the Medical Committee and after debate,

On motion of Mr. (Nathaniel) Scudder, seconded by Mr. (Samuel) Holton,

Resolved, That the farther consideration thereof be postponed.

On motion of Mr. (Nathaniel) Scudder, seconded by Mr. (William Churchill) Houston,

Resolved, That the director general, each of the deputy directors general, each physician and surgeon general, each senior physician and surgeon, each junior surgeon, each apothecary general, each chaplain and each apothecary's assistant, in the hospital of the United States, [to the north ward of the river Potomac] shall be entitled to draw clothing annually from the stores of the clothier general, in the same manner, and under the same regulations as are established for officers of the line, by a resolution of the twenty-sixth day of November, 1777.

Resolved, That until the further order of Congress, the said officers of the military hospital shall also be entitled to subsistence, in like manner as is granted to officers of the line, to be estimated in the following ratio:

⁸¹ Based upon an order of the Council of the State of Massachusetts of May 3, 1779.

⁸² Morgan's letter is in the *Papers of the Continental Congress*, No. 68, folio 133.

⁸³ The Shippen letter is in the *Papers of the Continental Congress*, No. 78, XX, folio 435.

⁸⁴ The Morgan letter is in the *Papers of the Continental Congress*, No. 63, folio 137.

1st. The director general to receive the same subsistence as a colonel in the line:

2d. The deputy directors general, the physicians, surgeons and apothecaries general, the same as lieutenant colonels:

3d. The senior physicians and surgeons the same as majors:

The junior surgeons and apothecaries' assistants the same as captains; and the chaplains, the same as chaplains of brigades are entitled to by a resolution of the 18th day of August last, and to commence from the said 18th day of August.

Resolved, That the mates of the military hospital shall, during service, be entitled to the same subsistence as is given to regimental surgeon's mates, by the resolution of the 18th day of August last.

October 28, 1779. 1216

Resolved, That the resolutions of yesterday, respecting the officers of the hospital department of the United States, be re-considered; and together with the report of the Medical Committee on the hospital department, be re-committed.

November 4, 1779. 1237

A letter, of 26 October, from Thadeus Benedict, was read,⁶⁵ respecting the conduct of Dr. Forster:

Ordered, That it be referred to the Commander in Chief, and that he be directed to cause such proceedings to be had thereon, as that the charges alluded to in it be speedily enquired into and justice done.

Ordered, That the Medical Committee transmit to the Commander in Chief the memorial of Thadeus Benedict and others, against Dr. Forster, and such other papers as they may have respecting that matter.

November 5, 1779. 1240

A letter, of 4, from Doctor Forster, was read, requesting that a court of enquiry may be appointed to examine into his conduct.⁶⁶

Ordered, That it be transmitted to the Commander in Chief.

November 16, 1779. 1277

The Medical Committee, to whom were referred the resolutions of 27 October respecting the officers of the hospital department, together with the report of the said committee on the said department, which was re-committed, brought in a report:

Ordered, That the same be taken into consideration on Friday next.

The committee to whom was referred the letter of 25 October last, from Dr. J. Morgan, brought in a report; Whereupon,

Resolved, That it be recommended to the executive authority of the respective states, upon the application of the judge advocate for that purpose, to grant proper writs requiring and compelling the person or persons whose attendance shall be requested by the said judge, to appear and give testimony in any cause depending before a court martial; and that it be recommended to the legislatures of the several states to vest the necessary powers for the

purposes aforesaid in their executive authorities, if the same be not already done.

November 19-20, 1779. 1293, 4-6

Resolved, That the report of the Medical Committee on the hospital staff be postponed till tomorrow, and that the same be taken into consideration immediately after reading the journal.

Congress took into consideration the report of the Medical Committee on the hospital staff; Whereupon,

Resolved, That the director general, deputy directors general, the assistant deputy directors, the physicians and surgeons general of the hospitals and army, the senior surgeons, the second or junior surgeons, the apothecaries general and apothecaries' mates or assistants, the hospital chaplains, regimental surgeons and mates, mates of the military hospitals, commissaries, assistant commissaries, pay masters and stewards of the hospital, who shall have been in the service for the space of one year, and are at present employed in the same, shall each be entitled annually to draw cloathing from the stores of the cloathing general, in the same manner and under the same regulations as are established for officers of the line by a resolution of Congress of the 26 day of November, 1777.

Resolved, That until the further order of Congress, the following officers of the military hospital shall be entitled to subsistence, in like manner as is granted to officers of the line by a resolution of the 18th day of August last, and in the following proportions, viz. each deputy director general, 500 dollars per month; each assistant deputy director, 400 dollars; each physician general and surgeon general, 500 dollars; each physician and surgeon general, 500 dollars; each senior surgeon, 400 dollars; each junior surgeon, 300 dollars; each apothecary general, 400 dollars; each apothecary's assistant or mate, 100 dollars; each commissary, 300 dollars; each commissary's assistant, 200 dollars; each clerk, who is to be pay master, 200 dollars; each steward, 100 dollars; each chaplain, 400 dollars;

The same to commence from the 18 day of August last.

[*Resolved*, That all the said officers of the military hospital and all regimental surgeons and their mates who shall continue in the service to the end of the present war, shall be entitled to quotas of lands respectively, in like manner as is stipulated, in favour of officers of the line by the resolution of the day of , which quotas shall be ascertained and apportioned according to the rate of subsistence above granted.]

Resolved, That all mates necessarily employed in the military hospital or army shall, during service, be entitled to the same subsistence as is given to regimental mates, viz. 100 dollars per month.

Resolved, That the remainder of the report be re-committed.

November 22, 1779. 1297

A letter, of 19th, from George Morgan, was read:

Resolved, That the Medical Committee be instructed to revise the several resolutions passed respecting

⁶⁵ This letter is in the *Washington Papers*, No. 92, folio 312.

⁶⁶ The Forster letter is in the *Washington Papers*, 92, folio 311.

the hospital department, and to digest and arrange them with such amendments as may make the whole consistent with and conformable to the alterations made by Congress in the original system, and report the same to Congress.

November 24, 1779. 1303

A letter, of 22d, from Doctor J. Morgan, was read:⁸⁷

Ordered, That the same be transmitted to the Commander in Chief, Doctor Shippen being first furnished with a copy thereof.

November 25, 1779. 1310

That on the application of the Medical Committee, the following warrants issue in favour of Doctor Isaac Forster, deputy director general of the eastern department, amounting to one hundred and fifty thousand dollars, for the use of his department; for which he is to be accountable, viz:

December 10, 1779. 1366

A letter, of 8, from D(avid) Jackson and a memorial from the officers in the hospital department, were read:⁸⁸

Ordered, That they be referred to the Medical Committee.

December 13, 1779. 1373

The director general, to whom was referred the report of the commissioners on the memorial of Lewis Weiss in behalf of the single brethren of Bethlehem, having reported thereon, and the said report being read:⁸⁹

Ordered, That a warrant issue on the treasurer, in favour of Lewis Weiss, attorney of John Bonn, warden of the single brethren of Bethlehem, for three thousand and seventy seven dollars and 60/90 for the use of the said brethren, being in full of their account for evacuating, repairing and re-entering their house, which was used as a general hospital for the space of eight months, in lieu of rent and all other demands.⁹⁰

December 22, 1779. 1400

A letter, of 20, and one of 22d, from Doctor Morgan, were read:⁹¹

Ordered, That they be referred to a committee of three:

December 24, 1779. 1409

The committee to whom was referred the letter of 20, from Dr. Morgan, brought in a report, which was taken into consideration; and thereupon,

Resolved, That on the trials of cases not capital before courts martial, the depositions of witnesses not in the line or staff of the army, may be taken before some justice of the peace, and read in evidence, provided the prosecutor and person accused are present at the taking the same, or that notice be given of the times and places of taking such depositions to the opposite party four days previous

thereto, where the witness resides within the distance of thirty miles from such party, and six days where the witness resides above the distance of thirty, and not exceeding eighty miles, and a reasonable time for a greater distance.

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SUMS ADVANCED IN THE HOSPITAL DEPARTMENT

Feb.	26.	To Jonathan Potts, deputy director	150,000
March	10.	To do.	150,000
April	16.	To do.	500,000
Sep.	20.	To do.	221,144
Jan.	16.	To doctor Isaac Forster, deputy director eastern district	75,000
April	27.	To do.	100,000
June	12.	To do.	150,000
Nov.	25.	To do.	150,000
June	29.	To S. Kennedy for rent of hospital at Yellow Springs	5,000
			Dollars 1,501,144

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FARTHER SUMS ADVANCED IN THE PAY-OFFICE DEPARTMENT

Jan.	9 and 20.	3857	5-90
Feb.	9.	2102	26-90
March	30.	. . . . .	2275	5-90
April	12.	. . . . .	2152	70-90
May	13.	. . . . .	2300	4-90
June	12.	. . . . .	2373	6-90

January 1, 1780. 1

A letter, of 30 December, from Doctor J. Morgan, was read, requesting to be furnished with copies of the following letters and returns of Doctor W. Shippen, viz:⁹²

Letters previous to October 9, 1776, on which were founded the resolves of that day; of November 1, 1776, including the return of the sick; November 9, 1776; November 24, 1777, and return of the sick, also return of the hospital officers; January 19, 1778, with the return of the hospital officers, &c., also Governor Livingston's, to which it refers; January 26, 1778, to Francis Lewis, Esquire; Whereupon,

Ordered, That Doctor Morgan's request be complied with and that those of the papers which are in the possession of the Medical Committee be lodged in the Secretary's office for that purpose.

January 3, 1780. 10-12

According to order, Congress took into consideration the report of the Medical Committee, viz.

That each and every officer hereafter mentioned and described in this resolve, belonging to the medical department in the hospitals, or army, who is now in the service of the United States, and shall continue therein during the war, and not to hold any office or profit under the United States, or any of them, shall after the conclusion of the war, be entitled to receive, annually, for the term of seven years, if they shall live so long, viz: the physicians

⁸⁷ The Morgan letter is in the *Papers of the Continental Congress*, No. 63, folio 143.

⁸⁸ Letter of Jackson and enclosures, in the *Papers of the Continental Congress*, No. 78, XIII, folio 125-33.

⁸⁹ Shippen's letter, dated this day, is in the *Papers of the Continental Congress*, No. 19, VI, folio 513.

⁹⁰ This report, dated December 4, is in the *Papers of the Continental Congress*, No. 136, III, folio 873.

⁹¹ Morgan's letter of the 20th is in the *Papers of the Continental Congress*, No. 63, folio 165.

⁹² This letter is in the *Papers of the Continental Congress*, No. 158, folio 305.

general, surgeons general, the physician and surgeon general of the army, the deputy directors general, each, a sum equal to the half pay granted and extended to a colonel in the line of the army by a resolve of Congress, of the 15 of May, 1778; the senior surgeons and physicians, assistant deputy directors, and the apothecary general, each, a sum equal to the half pay of a lieutenant colonel, granted and extended by the resolve aforesaid; the junior or second surgeons of the hospitals and the regimental surgeons, each, a sum equal to the half pay of a major in the line, granted and extended as aforesaid; the mates of the regimental surgeons, the apothecary's mates, or assistants, each a sum equal to the half pay granted and extended to a lieutenant in the line of the army, by the resolve aforesaid; the whole of the foregoing allowances are to be subject in every respect to the same rules, restrictions and limitations, upon which the half pay of the aforementioned officers of the line was granted and extended by the said resolve, of the 15 of May, 1778.

That each of the aforementioned and described officers in the medical department, or their legal representatives, respectively, shall be entitled to the like quantity of lands with the aforementioned and described officers of the line, in due proportion to the sums granted to them respectively by the preceding resolve, upon the same conditions, and subject to the same rules, restrictions and limitations, as the grants of lands to the aforementioned officers of the line, by a resolve of Congress of the 16 September, 1776.

On the question to agree to the first proposition for granting half pay, the yeas and nays being required by Mr. (Roger) Sherman,

So it passed in the negative.

On the question to agree to the second proposition for granting lands, the States were equally divided, and the question lost.

January 27, 1780. 99

That the Medical Committee, as soon as they shall judge convenient, give directions for removing the hospitals in or near Philadelphia, to some other place, where wood and other necessities may be procured on more reasonable terms than in the city aforesaid:

That the issuing commissaries be respectively directed not to deliver rations, or parts of rations, to any hospital commissary, unless on returns signed by him and countersigned by the principal physician or surgeon of the respective hospitals, specifying the names and stations of the persons for whom, and for what time, the rations are drawn; and that the hospital commissary be also required to annex to each return the receipts of the persons to whom he shall have delivered the provisions drawn on the last return:

⁹² This report, in the writing of Elbridge Gerry, is in the *Papers of the Continental Congress*, No. 29, folio 123.

⁹³ This memorial, dated January 3, 1780, is in the *Papers of the Continental Congress*, No. 41, X, folio 423; the letter from officers in the hospital department, dated February 7, 1780, is in the *Papers of the Continental Congress*, No. 78, XX, folio 499.

⁹⁴ This report is in the *Papers of the Continental Congress*, No. 136, IV, folio 79.

That the commissary general of issues direct the form of the returns and receipts aforesaid.⁹⁵

February 7, 1780. 130

A letter from sundry officers in the hospital department was read:

Ordered, That it be referred to the Board of War, to take order.

A memorial from President Wheelock, of Dartmouth college, was read:⁹⁶

Ordered, That the same, together with the report of the committee on a memorial from the late Doctor Wheelock, be referred to the Board of War.

February 9, 1780. 143

That on the application of the Medical Committee, a warrant issue on the treasurer, in favour of Jonathan Potts, purveyor general in the middle district, for sixty thousand dollars, to defray the necessary expences of the department; and for which sum he is to be accountable.⁹⁷

February 14, 1780. 166

The Board of Treasury beg leave to report

That a warrant issue on Thos. Smith Esq^r Commissr of the Continental Loan Office for the State of Pennsylvania for Thirty six thousand nine hundred dollars in Loan Office Certificates

Negatived in favor of Jonathan Potts Purveyor

General of the Hospitals, or order, for which sum the said Purveyor General is to be accountable.⁹⁸

March 1, 1780. 220

Two letters, of February 4th and 14, from Philip Turner, were read:

Ordered, That they be referred to the Medical Committee.

March 18, 1780. 260

That on the application of the Medical Committee, the following warrants issue in favour of Jonathan Potts, purveyor general of the hospitals, for the use of his department; and for which, amounting to forty six thousand nine hundred dollars, he is to be accountable; viz.

March 30, 1780. 317

A letter, of 11, from Doctor I. Forster to the Medical Committee was laid before Congress and read.

Ordered, That it be referred to the Board of Treasury.

April 4, 1780. 326

A letter, of 28 March, from Doctor J. Morgan, was read.⁹⁷

April 5, 1780. 330

That on the application of the Medical Committee of the third instant, a warrant issue on Henry

⁹⁶ This report is in the *Papers of the Continental Congress*, No. 136, IV, folio 91.

⁹⁷ Morgan's letter is in the *Papers of the Continental Congress*, No. 63, folio 169.

(Note) A letter from W. Rickman, dated April 23, 1780, appears to have been read. It is in the *Papers of the Continental Congress*, No. 78, XIX, folio 311.

Gardiner, treasurer of the State of Massachusetts, in favour of Isaac Forster, deputy director general of the hospitals in the eastern department, for forty thousand dollars, being part of the monies raised in the said State, for the use of the United States, and for the use of that department; for which the said deputy director general is to be accountable.

May 4, 1780. 412

Ordered, That a member be added to the Medical Committee.

The member chosen, Mr. (James) Henry.

May 10, 1780. 417

A letter, of this day, from Doctor J. Morgan was read, requesting "to be indulged with an authenticated copy of his Excellency General Washington's letter to Dr. Shippen, referred to in the General's letter to him (Dr. Morgan), of January 6, 1779, dated about the beginning of November, 1776, and enclosed to the President of Congress in Doctor Shippen's letter, dated 9th November, 1776."

Ordered, That Doctor Morgan be furnished with a copy of the said letter, agreeably to his request.

May 12, 1780. 425

The Board having considered the letter of William Rickman Deputy director general of the hospitals in Virginia referred to them by Congress report

That the said William Rickman is not charged with any monies in the Treasury books, [and that if he has received any monies that he is accountable to the Director General who is to account with the United States.]

May 16, 1780. 430

The Board on the references relative to the Children of the late General Warren Report,

That the accounts for the Education of Joseph Warren his eldest son have been paid to Doctor John Warren up to April 1779 and that no accounts have since been rendered,

That they know of no resolution of Congress making provision for the education of any other of the Children of the said late General Warren.⁹⁸

May 20, 1780. 442

On motion of the Medical Committee,

Resolved, That on the application of the Medical Committee, the Commercial Committee be authorised to furnish Doctor Potts, the purveyor general, with two hogsheads of sugar, for the use of the hospitals in the middle district, the said purveyor general to be accountable.

Resolved, That on the application of the Medical Committee, the commissary general of purchases be directed to furnish the purveyor general with two hogsheads of spirits, for the use of the hospitals in the middle district, the said purveyor general to be accountable.⁹⁹

May 23, 1780. 447

Congress took into consideration the report of the

Medical Committee, to whom was referred the letter from Governor Trumbull, of the 1st inst.; and thereupon,

Resolved, That the director general, or in his absence, deputy director general, of the hospitals in the eastern district, be and he is hereby directed to hire a suitable house at or near the port of New London, in the State of Connecticut, for the reception of such sick American prisoners as shall, from time to time, be exchanged and landed in that neighbourhood; and that one senior surgeon or physician, and a suitable number of mates, be occasionally employed therein, as the number of sick shall increase or diminish.¹⁰⁰

June 26, 1780. 562

That on the application of the Medical Committee, a warrant issue on Abraham Yates, commissioner of the continental loan office for the State of New York, in favour of Robert Johnson, assistant director of the hospitals in the northern department, on account of Jonathan Potts, purveyor general of the military hospitals, for the sum of fifty thousand dollars, one half of which, payable in loan office certificates, and the other half in current money of the United States, to be applied in the department aforesaid; and for which the said Jonathan Potts is to be accountable.¹⁰¹

July 1, 1780. 581

A letter, of this day, from the Board of War was read:

Ordered, That the same be referred to the Medical Committee, and that they take order thereon.

July 6, 1780. 589

Ordered, That on the application of the Medical Committee, a warrant issue on the treasurer, in favour of Jonathan Potts, purveyor of military hospitals, for twenty thousand dollars for the purpose of purchasing necessities for the hospitals in the middle department; and for which the aforesaid Jonathan Potts is to be accountable.¹⁰²

July 7, 1780. 592

Resolved, That a member be added to the Medical Committee, in the room of Mr. (James) Henry, who is absent:

The member chosen, Mr. (Abraham) Clark.

July 18, 1780. 638

Another letter, of 15, from General Washington was read, enclosing the proceedings and sentence of a general court martial on the trial of Doctor W. Shippen, Junr, director general of the military hospitals:

Ordered, That the consideration thereof be assigned for to morrow.

Another letter, of 15, from General Washington was read, respecting the hospital department.

Ordered, That it be referred to the Medical Committee.¹⁰³

¹⁰¹ This report is in the *Papers of the Continental Congress*, No. 136, IV, folio 367.

¹⁰² This report is in the *Papers of the Continental Congress*, No. 136, IV, folio 409.

¹⁰³ Washington's letters are in the *Papers of the Continental Congress*, No. 152, IX, folios 25 & 19.

⁹⁸ This report is in the *Papers of the Continental Congress*, No. 136, IV, folio 303.

⁹⁹ This report, in the writing of Frederick A. Muhlenberg, is in the *Papers of the Continental Congress*, No. 22, folio 89.

¹⁰⁰ This report, in the writing of Frederick A. Muhlenberg, is in the *Papers of the Continental Congress*, No. 22, folio 87.

July 19, 1780. 646

According to the order of the day, Congress took into consideration the proceedings of the court martial on the trial of Doctor W. Shippen, director general of the hospitals, and some time being spent therein;

Ordered, That the farther consideration thereof be postponed till to morrow.

July 20, 1780. 648

Congress resumed the consideration of the proceedings of the court martial on the trial of Doctor Shippen; and having made some farther progress,

Ordered, That the farther consideration thereof be postponed till to morrow.

July 21, 1780. 648

The Medical Committee, to whom was referred the letter of 15, from General Washington, brought in a report, which was read; Whereupon,

The Medical Committee to whom was referred the letter of the Commander in Chief of July 15th beg leave to report,

That they have conversed with D. Cochran and other gentlemen of the Hospital department by whom, and the many distressing accounts the Committee almost daily receive from every quarter, it appears that the department is in want of almost every article necessary for the comfortable sustenance of the sick and wounded soldiery. They are therefore clearly of opinion that a sum of two hundred thousand dollars is immediately necessary to put the department on such a footing, that the danger the General apprehends in his letter may be avoided. They beg leave to refer to the enclosed estimate and submit the following resolution.

Ordered, That a warrant issue on the treasurer, in favour of Jonathan Potts, purveyor of the hospitals in the middle district, for two hundred thousand dollars, for the use of the hospitals in the middle district, to be applied as the Medical Committee shall direct; the said purveyor to be accountable.¹⁰⁴

The Medical Committee, to whom was referred the letter, of 15, from Doctor Brown, brought in a report, which was read; Whereupon,

The Medical Committee to whom D. Will, Brown's letter of July 15th was referred, beg leave to report:

That they have conversed with D. Brown and find that his circumstances will no longer permit his continuance in the service, and as it appears to them that he has been a faithful and diligent officer they submit the following Resolution.

Resolved, That Congress entertain a high opinion of the abilities, integrity and past services of Doctor William Brown, physician general, but as his present circumstances will no longer permit his continuance in the service, his resignation be accepted.¹⁰⁶

July 22, 1780. 654

Congress resumed the consideration of the proceeding of the court martial on the trial of Doctor Shippen, and having made some farther progress,

Adjourned to 10 o'Clock on Monday.

¹⁰⁴ This report, in the writing of Frederick A. Muhlenberg, is in the *Papers of the Continental Congress*, No. 19, VI, folio 287.

¹⁰⁶ This report, in the writing of Frederick A. Muhlenberg, is

July 27, 1780. 676

Congress resumed the consideration of the proceedings of the court martial on the trial of Doctor W. Shippen, Junior; and some farther progress being made.....

July 28, 1780. 677-8

Congress resumed the consideration of the proceedings of the general court martial on the trial of Doctor W. Shippen; and some farther progress being made therein,

Ordered, That the farther consideration thereof be postponed.

July 29, 1780. 680

Congress resumed the consideration of the proceedings of the general court martial on the trial of Doctor W. Shippen; and some farther progress being made,

July 31, 1780. 684

Congress resumed the consideration of the proceedings of the court martial on the trial of Doctor Shippen, director general; and some farther progress being made therein,

August 7, 1780. 708

Ordered, That the Medical Committee report as soon as may be, the state of the military hospitals within the State of Pennsylvania, specifying particularly the number of physicians, surgeons, mates, matrons and attendants residing in Pennsylvania, and the places they are employed in, and also the number of the sick.

August 10, 1780. 716

W^m Shippen, D. G. H., 628,200 dollars, Rendered accounts.

August 16, 1780. 737, 8.

A letter, of 15, from Doctor W. Shippen was read.¹⁰⁸

Congress resumed the consideration of the proceedings of the court martial on the trial of Doctor Shippen, director general, and having gone through the evidence, defence and judgment of the court,

August 18, 1780. 744, 5, 6

Congress resumed the consideration of the proceedings of the court martial on the trial of Doctor Shippen, director general, when a motion was made by Mr. (Timothy) Matlack, seconded by Mr. (William Churchill) Houston, as follows:

That the court martial having acquitted the said Doctor W. Shippen, the said acquittal be confirmed.

A motion was made by Mr. (Abraham) Clark, seconded by Mr. (Nathaniel) Folsom, to amend the motion, by inserting after W. Shippen, these words, "excepting that part of the 2d charge relating to his speculating in hospital stores, on which the court judge him highly reprehensible."

The court martial having acquitted the said Doctor W. Shippen, *Ordered*, that he be discharged from arrest.

So it was resolved in the affirmative.

in the *Papers of the Continental Congress*, No. 19, I, folio 423.

¹⁰⁸ Shippen's letter is in the *Papers of the Continental Congress*, No. 78, XX, folio 541.

(Concluded in the next issue)

MILITARY SANITATION IN THE SIXTEENTH, SEVENTEENTH AND EIGHTEENTH CENTURIES¹

By COLONEL CHARLES L. HEIZMANN

U. S. A., Retired

SAN FRANCISCO, CAL.

PART I.—THE SIXTEENTH CENTURY

The Siege of Metz, 1552

THE 16th century was eminently one of sieges, from which date the origin of modern fortifications. In the preceding century the proportion of sieges to battles was nearly as 1 to 1; in the 16th, as 2 to 1; and in the 17th, about 4 to 3. Political, economical or strategic reasons may be given for these differences, but underlying them will be found a sufficient explanation in the history of the development of fire-arms. The ramparts of a town became the best defensive armor against the gradually increasing number and effectiveness of arquebuses and cumbrous pieces of siege guns, few of which could be brought into action in the field on account of the crude means of transportation. It is true that the smaller fire-arms were not in general use until the following century. As late as 1553 the lance was the favored weapon of the French, the pike of the Swiss, the two-hand sword of the Poles, bows of the English, sword and poignard of the Italians, halberd of the Germans, pistols of the Danes and arquebuses of the Spaniards. Yet one-third of the entire force of 40,000 fighting men, gathered by Henry II. of France, March, 1552, to invade Germany, possessed arque-

¹This article, which appeared in the *Journal of the Military Service Institution of the United States*, Vol. xiv, No. Lxiv, July, 1893, has been reprinted by permission.

²One fourth of the remainder of Henry's army had pistols, and from 1200 to 1500 mounted *barquebusiers* had guns three feet long, slung to the saddles-bows. Slings, long disused, were said to carry from 500 to 600 paces, and ancient Roman machines 700 yards; crossbows killed point blank at from 40 to 50 yards, elevated at from 120 to 160 yards.

buses, and Montluc relates the equipment, in the same year, of twenty men of each company with arquebuses that carried 400 paces from point to point.² Field artillery was comparatively rare during the whole of this period. Rabutin, who details the armament of Henry's army, mentions forty-three cannon, nearly all siege guns. On the other hand, cities of any importance were provided with large cannon, and as these were eventually opposed by artillery of similar calibre, more numerous because made more movable, further means of defense were invented, which proved a temporary advantage over besieging armies in the first years of the 17th century.

Forts and arms, however, did not always determine the result. Famine and disease were just as fatal.³ Knowledge of the means of prevention of epidemics and of precautions against their spread was very extensive in this century. Municipal and royal ordinances regulating the police of cities in time of peace were very common.⁴

The application of them in a besieged town by military authority ought to have been easy, yet the memoirs of the time are full of recitals of suffering and destruction due to their neglect. There was excuse for the absence of sanitary measures from armies in the field, in their transitory character, lack or weakness of medical organization, and general ignorance of the subject

³Of 57 besieged towns, 24 were carried by assault, 20 capitulated and 13 were relieved or the siege abandoned.

⁴The *Archives curieuses de l'histoire de France depuis Louis XI—Louis XVIII*, par L. Cimber, Paris, 1834, contain (9th vol. 1st series) a valuable and interesting document on the subject, by Claude de Rubys, being the history of the pest in Lyons, 1577.

as affected by the changed condition of living.⁵ Hence the dissipation of armies was frequent, on account of the want of food, the appearance of disease and consequent desertions.

The gallant array of Henry II. met with this fate in less than four months, although it encountered no serious military obstacle, nor fought a single battle. Its historian says that the camp followers outnumbered the troops proper, a common occurrence of those days, and together with the soldiers loaded the wagons with plunder from abandoned houses, thus causing disorder and famine in the camp. Summer approaching, on account of the great heat some started to march at 2 A.M., and remained on horse-back until noon before they were lodged;—the foot soldiers generally began the march first so as to reach their destination at the same time, and were overcome by thirst; they eagerly filled themselves with cold water and many “fell into great diseases, pleurisies and fevers,” a large number dying. Toul, Metz and Verdun were the trophies, but France was exhausted when it became known in July that the Emperor Charles V. was collecting a force to recapture these places.

Among the Emperor's many inheritances from his predecessor, Maximilian I., not the least were regulations for military organization and discipline, so that his armies were considered in these respects the best in Europe. Leonhard Fronsperger in 1555 wrote a work on Imperial courts-martial, etc., in which are found sanitary disposi-

tions for the *Landesknechte*. It is not known how far or often these were carried out, but it has been justly said, by Froelich, that the instructions for physicians and surgeons are the origin and basis of the present medical regulations of the German army, because no such existed in Germany before, and because there is so great a resemblance between them and those of to-day;—indeed, the latter are very little better than those that an enlightened past had brought to a high grade of perfection. Another authority⁶ asserts that Charles drew physicians and surgeons from all sides for his campaigns, and that, not satisfied with garrison hospitals, he instituted field hospitals, following the example of his grandmother, Isabella of Spain.

The custom in camp was to send the sick and wounded to the baggage train, where they were cared for in tents by the physician or barber and nursed by women, who then constituted a large following of armies. On breaking camp the light sick were transported in wagons and the dangerously sick sent to hospitals in the nearest towns. The *Landesknechte* selected from among their number and paid in common a *Spital meister*, or hospital superintendent, who looked after their sick in hospital or on the march, providing necessities and waiting on the physician, barber and women. The meanest duties were performed by women and children.

A field physician-in-chief and a field-barber were attached to the staff of the commanding officer of each *Hauften*,—5,000

⁵ I can find only one treatise on hygiene specially, printed in the 16th century,—Anton Schneeberger, *De bona militum valetudine conservanda*, 1564, a copy of which is in the Library of the Surgeon-General's office,—and a chapter in a surgical work by N. Godin, 1558. Occasional orders enjoining cleanliness were issued, presumably after their necessity became manifest; thus, the statute of the English Henry V. in the early 15th century, at Mans, and one of Henry VIII., in 1544, prohibiting “carrión, filth, or other unwholesome or infectious, stinking

thing to be near lodgings, and the same to be buried.” Altogether there were printed, mostly after Paré's first edition, 45 works or parts, on military surgery by both physicians and surgeons, most of whom had field experience,—1 on military pharmacy, and 11 on various military diseases.

⁶ L. Thomas, *Lectures sur l'histoire de la médecine*, Paris, 1885. He mentions particularly the celebrated anatomist Vesalius and a distinguished Spanish surgeon, Daça Chacon.

to 10,000 infantrymen; a physician to the field-marshal of cavalry, and a field-barber and assistant to the chief of artillery. All of these had rank and pay assimilated to superior officials. To each independent troop, each infantry company—about 200 men, and each squadron was assigned a field-barber. His place during battle when not in the ranks, was with the rear guard, and he ranked between clerk and halberdier, according to Fronsperger, after the quartermaster sergeant and before a corporal, according to others. He received a salary and could charge a soldier for special services.

“The physician-in-chief must have been a doctor, or one who had recently charge of surgeons or field-barbers by State authority; he must be a well-known, skilful, experienced and cautious man, of the proper age, upon whom all barbers, cutlers, wounded, sick and stricken could rely for help and counsel in time of need, particularly when they are shot, cut, bruised or broken, or are suffering from any accidental or disabling diseases, such as scalds, fluxes, fevers, and similar affections that occur among soldiers. His duties are even more extensive in that he should inspect, both when the regiment is organized and later at monthly muster, the instruments and everything pertaining thereto, and when he finds anything lacking or lost, such shall be charged to the field-barber, to make up the deficit. When this cannot be done, he shall find other means to meet emergencies. On the march he will closely attend his commanding officer. When exigency or peril impends from the enemy, in battle array or skirmishes and such like, he shall remain in the neighborhood of his superior military officer;—but he will also oversee as much as possible the other physicians, surgeons and the like, wherever wounded, etc., are to be attended, and he shall devote his care, advice and skill to all others, particularly because he, above others, is ready with instru-

ments, apothecaries and medicines for both internal and external wounds and sickness.

“He should also with all diligence, advise whether a leg, arm or such should be amputated or preserved by other means. Further, he should give his attention to the severely wounded, that they may not be left too long on the lines or in the companies, but immediately carried to the surgeons and aided by beneficial dressings. On the march, when it becomes important to have a field-barber near at hand or available, it is his business to see that one is stationed between the cavalry and infantry, with his instruments. On other occasions, in camp and quarters, each barber remains with the troop in which he has been assigned for duty. Whenever a question arises between barbers and cured soldiers or others, as to the payment to be made, he shall settle it, seeing that neither too much nor too little is given.

“As it is necessary that a field-barber or surgeon serve with each troop, so should each Captain be careful to select a well-versed, skilful, experienced and trained man, and not a poor beard-shaver or bath-boy as often happens by reason of favor; thus, the killing or maiming of good soldiers may be prevented. The field-barber should be supplied with all necessary medicines and instruments in a field wagon, and the Captain should see that it is done. He should be a capable *Knecht*, to help in necessity. His duty is to render assistance first, when there is need, to those of his own troop, not to exact too much from anyone, but to treat men at reasonable and like rates. He shall have his lodging at night at the company pennant, so that he may be found in necessity, and it is best that one barber should be accessible to each lodging house, on account of the sick and wounded. He shall serve with his troop in all else like an ordinary soldier, and he shall receive double pay.”

The greater part of the Imperial army

on this occasion consisted of *Landesknechte*,⁷ 14 regiments of 143 bands or companies, and it is presumed that some such medical organization obtained among them, for Fronsperger speaks of it as well known, not as having been recently introduced; and in 1557 at the siege of St. Quentin, an analogous arrangement of medical officers for the English ordnance existed, evidently copied from Maximilian's, and usually cited by English authors as the first attempt at the formation of a regular medical staff. The remainder of 120,000 men was made up of 27 Spanish companies, 16 Italian, more than 10,000 cavalry and 7,000 pioneers. There were 140 pieces of artillery. This army was said to have been larger, by 15,000 men, than any army gathered by Charles, and twice as large as any army collected under one chief afterwards for more than one hundred years. There is no record of a medical organization other than the German, but it is probable that a surgical service existed among the Spanish troops, such being mentioned in 1554 with Daça Chacon as head, and among the Italians, who employed surgeons for campaigns as early as the 13th century, and combined them in bodies for sieges in the previous century and even before.

To meet this formidable array the Duke

of Guise and other nobles occupied Metz, and formed and drilled in guard exercises 12 companies, in all 4,500 to 4,600 foot, 444 horse, and 920 gendarmes in 3 companies.

The military student ought to read Salignac for the particulars of preparation for defense made by the active genius of this young man, with very inadequate means;—the repairs to the fortifications with the aid of women and children, making serviceable old and badly cast cannons, construction of powder mills, razing of suburban gardens, pleasure resorts, mills, etc.; the storing of grains and provisions, purchasing in his own credit animals, salt meats, fish, butter, oil, salt, cheese, rice, etc., enough to last a year⁸ purging the city of superfluous persons and things, retaining and organizing 1,200 artisans, including carpenters, masons and blacksmiths to help in the ramparts and artillery, and armorers, farriers, bakers, shoemakers and hosiers, a limited number of the most expert and best provided with materials to meet the necessities of the soldiers;—the means of defense adopted in the event of breaches, or in case the walls were taken; the rules for the effective guard of the walls, for cavalry raids in large parties (100 to 120 men), and in small (20 to 30 men) on the enemy's supply trains, for ambushes,

cardamon and other spices "to put in our pastries, the principal ingredient of which was horse meat, and these would have tasted badly without them." Turnips, carrots, leeks, etc., were buried in the gardens and reserved for extreme necessity. Sir James Turner furnishes even a larger list of articles to be provided for an English army in the field in Elizabeth's time, including, besides, almonds, chestnuts and hazelnuts, honey and tobacco! The ordinary daily ration was 2 lbs. of bread, 1 lb. of flesh, or, in lieu of it, 1 lb. of cheese, 1 bottle of wine or 2 of beer. An ensign got 4 rations, a colonel 12. "'It is enough,' cry the soldiers, 'we desire no more.' It is enough in conscience;—but this allowance will not last very long;—they must be contented to march sometimes one whole week and scarce get two pounds of bread all the while, and the officers as little as they."

⁷ Salignac says they were levied in the manner and numbers of the Germans, and that the companies were not complete, coming recently from their country. It was the custom to enlist *Knechts* by voluntary engagement for the war only;—a fixed pay was agreed upon, and they were permitted to pillage and demand ransom. There arose from this *condottieri*, who had at their call bodies of men, of varying numbers according to the price paid, which were placed at the disposition of princes about to engage in war. There was no medical examination of a recruit, and when a *Knecht* was permanently disabled, he dragged himself to his home as best he could.

⁸ Paré's list is curious: biscuit, fresh beef, salt veal, bacon, saveloy, Mayence-hams; salt fish, as cod, marline, salmon, shad, tunny, anchovy, sardines, herring; also peas, beans, rice, garlic, onions, prunes, cheeses, butter, oil and salt; pepper, ginger,

for the interior police defining the relation of citizen and soldier, the duties of the former during an alarm of fire, etc., and of the latter to suppress disorder at any hour.

Rabutin visited Metz after the siege was raised, and inspected the numerous contrivances hastily made to meet every step of the enemy's advance. He also speaks of them somewhat in detail, and in the most admiring terms, especially of the pyrotechnical inventions of M. de St. Remy, who was among the besieged.

The energy and foresight of Guise did not stop here. Some soldiers of Rodemar, who had joined the garrison before the city was invested, were taken sick with a contagious disease;—they were at once isolated, and after having been mustered, were ordered to rejoin the camp of M. de Chatillon, their colonel. To the surgeon barbers of the city he advanced money to provide themselves with means to treat wounds. The pioneers, under the provost, were ordered to clean the city often, horses and carts being supplied, to throw carrion and all other filth out of the city, and to keep the streets always clean. When a soldier was wounded or taken sick, especially during the night watch or work that had to be done in the rain or extreme cold, it was ordered that he be carried at once to the hospital and then treated with everything necessary; and the pioneers, when taken sick or wounded while engaged on the ramparts, were to be sent to another hospital.

The siege began October 20th, but the defense was so well conducted that a breach was not effected before November 26th, by means of a constant battery of 40 double cannons for many days. It was as large as a front of fifty men. The besiegers found behind it another new and stronger rampart. The weather now became so

cold that sentries were found frozen stiff, lance in hand. The wounded in both armies, partly on this account, did not do well. Some of the imperial officers became dissatisfied with the treatment and sent many of their disabled soldiers to springs of their native country. A quack appeared in one of the three besieging camps, named Doublet, who met with such success by the use of simple water dressing that his fame spread.⁹ After the manner of the time Guise suspected poison in the drugs used in the city, and sent a message to the king, November 8th, requesting a new supply. Ambrose Paré was intrusted with the commission, and repairing to Verdun, was smuggled into the city, himself, an assistant and a medical outfit, at midnight on December 8th, by an Italian captain, whose services were purchased by 1,500 *écus*, an easy matter, it appears, since the Emperor had failed to keep his promises of payment.

Paré's reception and presentation by Guise to the princes and officers on the breach are historical, and his recital of his labors and observations is classical.

From his account and other sources it is learned that at this period in France, at least, surgeons, like physicians, in armies were not obliged to attend the soldiers. A few men of considerable merit were attached to the persons of captains or nobles, whom they followed, and upon whom they depended. Pierre Aubert, in his capacity of surgeon, thus served the Duke of Guise. When a campaign ended, usually in autumn, they passed the winter in the cities, in the pursuit of their customary civil practice. However, royal ordinances were beginning to be issued establishing more uniformity. In 1550 Coligny inspired a decree respecting infantry, which was remarkable in that it created in each company a surgeon, who was to take care of its sick and wounded on soldiers who had been abandoned by their comrades.

⁹ Frequent mention is made in those days of charlatans following in the train of an army to practice

in garrisons and campaign; his pay was not to come from the royal treasury, but from a tax on the sum total of the pay of the company. The company baker, one to each company, was paid in the same way.

The obstinacy and cleverness of Guise irritated the Emperor into an expressed determination to capture the city by force or famine at the cost of his entire army. This becoming known, it was ordered that no one in the city should eat fresh fish or venison or game birds, for fear that they might be pestiferous. The prescribed rations must suffice, and they were carefully distributed by weight and measure according to the quality of the persons. At first each soldier received two pints of wine and two loaves of bread, each of 12 ounces;—from these were gradually taken $\frac{1}{4}$ and $\frac{1}{2}$ ounce. Paré says that the rations were diminished in such a manner that what had been given to three was divided among four persons, and it was forbidden to sell or barter any remnants.

During the siege prisoners were treated with unusual consideration.¹⁰ The Emperor learning from some of his own soldiers returned from the city on parole, the extreme measures taken by Guise, watered his wine, as Paré puts it. His battery of forty-five days had not advanced and his mines had all been successfully met by countermines. The intensely cold weather persisted and was the cause of crowding in the tents, huts and holes dug in the ground and covered with stubble. Food became scarce; the surrounding country, having been previously devastated by Henry's expedition and by Guise's orders, furnished no resources, and much of the imperial supplies had been ruined by rain and snow. Clothing was so scarce, by reason of raids on the trains, that the greater part of the soldiers were barefoot. In consequence,

congelations, dysentery and scurvy were soon followed by typhus fever, and the mortality became frightful. The least estimate places the loss in the imperial army from all causes at 20,000 men.

On the sixty-fifth day, December 26th, the retreat was ordered and begun. It was done so hurriedly and covered so badly by the Marquis Albert of Brandenburg that some dead were left unburied and many sick and wounded were abandoned in their tents. Still, part of the disabled were carried away in carts, but the roads having been made impassable by the advance of cavalry and heavy cannon, a number of them were left at a neighboring abbey. To these Guise sent provisions and ordered Paré and several other surgeons to attend to their wants. A sallying party came across a number of sick Spaniards in wagons and let them pass unmolested. Considering these circumstances Guise departed from the custom of setting fire to the camps; he collected all the sick and sent more than three hundred to the hospital in the city, where many lost limbs by amputation; he ordered that all be fed and treated, and he buried the dead. After a few days he sent a trumpet to Alva, the imperial general, promising safe conduct to such persons as he might send to care for and carry the sick and wounded prisoners to Thionville, the objective point of the retreat, stating that he would gladly supply them with well covered boats for the purpose. Alva sent wagons and carts, but not enough, and Guise supplied the deficiency. Most remarkable of all, the imperial general asked that a sick Spanish officer of his command be permitted to enter the city for treatment, and the request was granted. The demoralization of the defeated army was so great that the French cart drivers, on their return, found the roads filled with the dead bodies of those who, before followed the example, both parties disdaining ransom.

¹⁰ At the siege of Metz in 1444, according to Mathieu de Coussy, the besieged amused themselves by drowning the prisoners, and the besieging French

piring, had been thrown there by the Spanish teamsters, who remarked that they were not paid to carry dead men.

The clemency of Guise proved a disaster, which would have been averted had the same precaution been taken as at the beginning of the siege. No serious disease had been in the city during the siege;—once it was raised, the importation of prisoners created an epidemic of typhus, which spread to the adjoining villages.

The defense of Metz became the marvel of Europe;—it, without doubt, saved France from destruction, and, in many ways, besides political, its effects were lasting. Wounded soldiers were afterwards better treated, as at the siege of Thionville, 1558, and after the capture of Havre, 1563, when the project of an *Invalides* originated with the queen mother, though it was not carried out for many years. The humanity of Guise towards both well and sick was remembered at the siege of Therouanne, 1553, by the Spanish, who, on being reminded of it by the French, courteously saved all prisoners, says Brantôme. After this the custom of massacring prisoners who were not reserved for ransom, gradually declined, and this was the germ from which arose the spirit that culminated, in a little over 300 years, in the articles of the Geneva Convention.

It was noteworthy also in the preparations made for it, other than purely military, of food, medicines, hospitals;—in the organization of artisans and surgeons; in the police and guard regulations and precautions against disease. The first suggestion of transporting wounded soldiers in numbers by water was made here. It was the first occasion when the services of the "father of modern surgery" were universally recognized in an army, by soldiers as well as officers, services that, in the following year, rendered his opinion of such importance, that he was called in the council of war to determine whether Hesdin

should be surrendered. Only a few months before it, at the siege of Damvilliers, Paré first tied an artery after amputation, discarding the cautery. On his return to Paris from Metz, he was appointed surgeon to the King, the highest position he could covet, and about this time his surgical discoveries began to spread throughout Europe.

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PART II.—THE SEVENTEENTH CENTURY

The Last Campaign of Gustavus Adolphus

Sully, the great Minister of Henry IV., under date of 1604, wrote in his Memoirs: "It is difficult to conceive that, in a nation, which from its establishment has been engaged in war and has indeed pursued no other trade than that of arms, no care should have been hitherto taken to form and methodize them. Whatever related to the soldiery of France was offensive and disgusting; the foot soldiers were enlisted by violence and made to march by a cudgel; their pay was unjustly withheld; they heard of nothing but a prison and had nothing before their eyes but a gibbet; their treatment drew them into all methods of desertion, which was prevented only by the *prevôts*, who kept them in the camp like men besieged; the officers themselves being ill-paid had some kind of right to violence and plunder. . . . The regulation (prompt payment) was followed by another equally just and equally proper to reconcile the mind to the trade of arms; by this there was a provision made for the relief

of soldiers who, by wounds or sickness contracted in the service, were unable to live either by war or labor; things were managed so that in their state of misery they wanted nothing either for their maintenance or care."

By the establishment of the *Maison royale de la Charité Chretienne* in 1600, the *droit d'oblat* was practically abolished. In virtue of this right the kings attached disabled and aged officers and soldiers to convents as lay brothers, who rendered service by ringing the bells and sweeping the chambers. It had been exercised since the beginning of the Carolingian race (752-987). The conception of a house in common for infirm soldiers is older than Sully's institution. Philip Augustus of France (1165-1223), St. Louis in 1260, the charter of the *chevaliers de l'Etoile* in 1352, contemplated it; Mary of England left a provision in her will, 1558, for such a retreat, but no attention was paid to it, and the mother of Henry III. of France in 1563 promised it. Many private individuals followed the example, among them Sir Thomas Coningsby, who founded a relief for worn-out soldiers in Hereford in 1614. The *Maison* decayed insensibly under Louis XIII., a pension of 100 livres was substituted in place of the *oblat*, and after another ineffectual attempt by the organization of the Commandery of St. Louis in 1633, the *Invalides*, proposed in 1659, was finally started in 1676. In England Chelsea was foreshadowed by the fourth of the Articles for his Majesty's Guard, 1663, and commenced operations in 1682; Kilmainham in

Ireland in 1693, and Greenwich for seamen in 1695.

From remote antiquity disabled and maimed soldiers excited general commiseration and were provided for in various ways, by pensions, assignment of lands, etc. The reasons for founding asylums for them are obvious and are often mentioned; economy, repression of beggary and control of vices that were especially prevalent among discharged mercenaries.¹¹ No permanent means were taken, however, other than civil hospitals, to preserve the soldier temporarily disabled in active service, or in time of peace, until enlistment became universally established for a period longer than the duration of a war, and when officers became irremovable and dependent on the sovereign; until a regular royal military service was organized having greater cohesion, better discipline and administrative departments, than were possessed by the so-called standing armies before the 17th century. For France, Richelieu is credited with the first system of sedentary hospitals on the frontier near the scene of war, at Pignerol,¹² (1630) for the army in Italy. They were all placed directly under the superintendence of a *chirurgien-major des camps et armées*, the first appearance of this title. Other nations,—Austria, Prussia, Denmark and Sweden,—continued to furnish treatment for sick and wounded soldiers in quarters and tents, exceptionally in civil hospitals, until the middle of the 18th century. The persistence of regimental hospitals in England and America to the beginning of the present century, is a relic of the company methods of the 16th cen-

¹¹ In the time of Henry II. and Francis II. disabled soldiers and widows went to Fontainebleau to demand, not pensions, for these were not yet in vogue, but assistance. The cardinal Minister Claude de Lorraine, for an answer, caused to be trumpeted that those who came to seek relief must leave in twenty-four hours, under pain of being hanged, and he actually had a gibbet erected for the purpose under the window of the king himself. (Audouin, *Histoire de l'administration de la guerre*.)

It was found during the reign of Louis XIII. that the soldiers dissipated their pension and lived in misery the rest of the time. (*Histoire de l'hôtel des Invalides*, in *Archives curieuses etc.*, par Danjon, 2d series.)

¹² About 70 miles from Casal, the seat of the final military operations. The building was standing in 1858.

tury. Permanent, or garrison, and port, or naval, hospitals soon followed the sedentary in France (probably an outcome of epidemics), but nowhere else, and were prominent among the military reforms of Louvois undertaken with the aid of Martinet and Dumetz, and dating from 1666, Vauban designating places for hospitals in all the captured towns of Alsace and Flanders, which he fortified.

The crude field system of the 16th century was limited to the company infirmary with the occasional help of civil hospitals. Sully's establishment at the siege of Amiens, 1597, was an improvement on this, but was not, as has been stated, the first ambulance hospital.¹³ It had more of the character of a field hospital, was supported by a tax on sutlers, tavern-keepers, haberdashers, tailors and shoemakers in the train of the army, and was so well directed by Pigray, a pupil of Paré and the king's physician-surgeon, that officers preferred to be treated there. This was, nevertheless, the first impulse given to a change of former methods and to the development of organization, on military models, for the care of sick and wounded soldiers, whether on the field or at sieges.

Throughout Europe the condition of the soldier and officer began to improve at the beginning of the century, and with it the quality and number of surgeons; though medical attendance was not yet deemed a soldier's right or even a department of State.

In England more interest was taken in military matters generally, and officers were imported to instruct the militia, there being no standing army proper. Much confusion prevailed in sanitation. A regi-

ment of 2,200 men sent by James I., 1620, to the Palatinate, was accompanied by medical officers, but there was no allowance for medicines or hospitals in the estimates, though made by experienced officers, and, consequently, it suffered much from privation. The original plan for the expedition contemplated two physicians, two surgeons and two apothecaries on the staff of the general; one surgeon to a regiment of 1,800 men with pay of captain, and one surgeon to each company of 150 men, with pay of ensign; one surgeon to the general of horse, one to each cavalry troop of 100 men, and one surgeon to the ordnance and pioneers.¹⁴

The English contingent of 12,000 foot and 200 horse to Count Mansfeld's expedition to the Netherlands, 1624, was likewise provided with surgeons, but owing to incompetency or want of supplies it lost one-half of its men from contagious diseases. The scarcity of surgeons compelled Charles I. to issue a mandate, 1628, to the Surgeon's Company to "impress sixteen able and efficient chirurgions" for the force of 4,000 men collected for the relief of Rochelle. In 1630 the Scotch troops in Sweden, 12,000 men, had four surgeons to a regiment, they being reckoned among the staff officers, who took priority over the line. About this period there was introduced in the army in Ireland the rank of physician-general, surgeon-general in the East India service, regimental surgeon in the army and surgeon's mate in the navy. As early as 1614 there was improvement in the navy, and to Woodall, originally an army surgeon, were due the assignment of surgeons to the East India ships, outfits

¹³ A similar field hospital was established at the siege of Rouen, 1591, and in the same year an edict was issued taxing wines and ciders of tavern-keepers, the proceeds to be applied to the care of wounded soldiers.

¹⁴ Another account describes a regiment as con-

sisting of 13 companies, one being the colonel's; the 12 had 144 privates each, the colonel's 192; each company had a surgeon; on the regimental staff was a chief surgeon, who was also surgeon of the colonel's company; each cavalry troop had 70 cuirassiers and 30 carbineers with one surgeon.—*Colburn's United Service Magazine*, 1836, part 3.

of medicine chests, and the introduction of lime juice for the prevention and cure of scurvy. Not until 1660 do we find a purely military expression of interest in the hygiene of troops, and that by Sir James Turner. During the civil war the character of the soldiery was necessarily of a higher order than usual. In the parliamentary ranks Sydenham rose to a captaincy and subsequently became the greatest observer of medical facts of modern times. On the royal side served Harvey, the discoverer of the circulation of the blood, as physician to the king, and Wiseman, the best English surgeon of his day. The proverbial conservatism of the English is nowhere shown so well as in the retention of crossbowmen in their armies as late as 1672.

Among the Germans the soldiers of the duchy of Brandenburg (united with that of Prussia, 1611) were at first in a wretched condition. They were not provided with a commissary, and in 1620, when Brandenburg raised troops, they received the privilege of begging through the country; the peasantry were ordered to give each soldier a farthing every time he begged and a good thrashing with a stout cudgel, if he was not satisfied. The few permanent troops before 1653,—the Elector's body guard of 100 men and several companies of *Landesknechte* distributed among various strongholds,—grew in that year to 52 troops of cavalry and 82 companies of infantry, and in 1656 to a force of 25,000 men. The system of company field-barbers remained; those of the infantry were equipped and armed like other soldiers, though their rank was gradually raised; they received, besides their pay, a small sum from each man, "basin-money," for shaving twice a week. Each regiment had a physician on its staff and a field-barber, who got from each soldier monthly

a stipulated amount to support the regimental medicine chest; both were liable to be called by the company barbers, the physician only in severe cases.¹⁵ During the first years of the century this was, likewise, the status in the Saxon army, in which nursing, by the consent of the commanding officers, was still done by camp women who accompanied the soldiers in the march, the regulation prescribing that they should be neither "lewd nor suspected." Not until 1683 was there a head to the surgical personnel, a staff physician in the *cortège* of the general, whose duty it was to look after the proper arrangement of the hospitals and superintend the barbers and apothecaries therein. There were also a staff field-barber and field apothecary in the same body. The rank of all these is supposed, by Froelich, from their pay and rations, to have been that of ensign. The physicians and surgeons furnished their own mounts, and received forage; the apothecary was allowed six horses and two wagons. Toward the end of the century there appears a general staff surgeon, and the regimental barber's rank was then fixed among the officers, but that of the company barber was still between quartermaster sergeant and corporal. That the social and official position of medical men was then improved is shown by the fact that a captain of horse, Gehema, became physician to the Brandenburg Guard. In his capacity as an officer of the line he had observed the faults of the sanitary service, particularly manifest in the character of the field physician and subordinates and of medical supplies, and he made vigorous, but almost ineffectual, efforts to reform them. Minderer, a Bavarian, was an esteemed writer, 1620, on military medicine, including hygiene of troops and camps, and Purmann, surgeon-major in the Brandenburg army, published a celebrated treatise

sicians were the first Prussian surgeons-general, beginning with Brandhorst.

¹⁵ Eventually a general oversight, only in time of war, was given to the physicians of the guard, thus making the organization more of a unit. These phy-

on military surgery in 1680. The medical organization throughout Germany, however, continued to be so poor that soldiers perished in numbers; as late as 1685-87, of 3,000 men sent by Saxony to aid Venice in the Morea only 761 returned.

It is natural to infer from the number and variety of military medical institutions in France, that there was greater advancement in the quality and numbers of the personnel. Before the invention of sedentary hospitals for armies in the field, Richelieu began to improve the field hospitals, first at the siege of Rochelle, 1627, by attaching to them persons whose duty it was to distribute *bouillons* and medicines, even to those who could or would not seek their aid. There was as yet no uniformity in the assignment of physicians and surgeons,¹⁶ but they became more an official part of the army. In 1638 he published an ordinance, which is considered, by Morache, as the foundation of true ambulances. Like the system adopted at the siege above mentioned it provided Jesuits and cooks to give *potages* and *bouillons* to the sick who did not want to go to the field or sedentary hospitals, and a surgeon and apothecary;—a large army was to have 4 priests, a lay brother and a cook with 5 assistants, 2 wagons with food and six sheep;—small armies, 3 priests, a cook with 3 assistants, 1 wagon and three sheep. The priests were to look after the spiritual welfare of the sick. The majority of surgeons of hospitals and regiments were members of the College of St. Côme, Paris; and Percy says that in

the latter half of the century, there was no surgeon of any merit or reputation, who had not served in the armies, such service being the readiest means of obtaining employment. Instances are recorded of men from the rank of private rising to distinction in science and in medicine and surgery, notably the philosopher Descartes, whose mathematical and physical discoveries and physiological observations place him among the promoters of medical science, and Jacques Beaulieu, a famous lithotomist. Richelieu also organized the administrative departments generally,¹⁷ and the details of the edicts affecting them were admirable, though experimental and not always successful in results. During the retreat, in 1635, of the army of la Valette on the Rhine, the hospitals were still unorganized and there was no transport service for the wounded. It was on this occasion that the young Turenne having, as was customary, several carts loaded with personal baggage, plate, etc., ordered the contents to be thrown away and the carts filled with wounded; he also picked up bodily a wounded soldier and tied him on his own horse, which he led to a place of shelter. The medical service excited in 1667 the personal interest of Louis XIV. so much that he sent for three of the most skilled surgeons of Paris for the army in Flanders,—Turbière, to whom was first given the title of *chirurgien-major consultant des camps et armées*, Bienaise, renowned as the most intrepid operator of the century, and Gayant, who was the first surgeon to be admitted to the Acad-

¹⁶ Thus, this year, 2 surgeons to the *Chevaux Légers*,—212 men; 1 to a company of *Mousquetaires*,—343 men; 2 surgeons and 1 physician to the guards,—4,602 men; 1 physician and no surgeon to the *Suisses*,—2,516 men; 1 surgeon to the *Gardes du Corps*,—145 men; many organizations had neither physician nor surgeon.

¹⁷ Troops in garrison were supplied with bread in kind by a contractor, its cost being withheld from the pay. Troops on the march were supplied with

larger rations at the expense of the municipalities: daily for each man, 2 pounds of bread, 1 pound of meat, salt, vinegar, and one pint of wine, fuel for light and heating, and the loan of table linen, a bowl and a glass;—forage was also to be supplied to the horses. During the campaign the system of contracts on a large scale was followed to furnish everything including transports, the contractor being represented by a *general des vivres*, who had under him a large personnel.

emy of Sciences.¹⁸ By 1674 it had so grown and was so well managed that at the battle of Seneffe, the Intendant Robert could distribute in three villages 230 military surgeons assisted by nurses, with the necessary material to care for an exceptionally large number of wounded. In 1683 it was ordered that during a campaign the sick be lodged before the officers.

The Thirty Years' War brought Sweden into prominence as a military nation, and its most brilliant achievement was the last campaign of Gustavus Adolphus, beginning June, 1630, by the landing in Pomerania of an army of 8,000 men, reinforced at first by six Scotch regiments, about 7,000 men. Of this force both regiments and companies of infantry and cavalry varied in the number of men. The differences were more marked in the infantry,¹⁹ but four surgeons were always among the regimental staff officers of both arms, as well as a quartermaster (ranking between major and captain), a provost (and his archers), a recorder, two chaplains, eight sutlers and a drum-major. All soldiers had swords, long swords or sabres. Two-thirds of the foot were armed with matchlock muskets, the forked rest being suppressed, and cartridge boxes instead of shoulder belts; and one-third with pikes 11 feet long, the iron part being 2 feet long and 4 inches broad at the widest part. The *cuirasseurs* had carbines and two pistols each, the dragoons, or light cavalry, light muskets and axes. Armor was then falling into disuse, because it could be easily penetrated by the heavy bullets;—the head only was specially protected by a helmet or iron cap, the jackets

being of sheep-skin, excepting those of the *cuirasseurs*, who had simple breastplates. The infantry company was in six ranks, the cavalry in four and two squadrons. The artillery pieces differed in calibre, the novel feature being the field-guns worked by the infantry. These consisted of a thinly beaten cylinder of copper, the chamber reinforced by four bands of iron, and the whole wound by rope and covered with rawhide;—they were mounted on carriages so light that two men could drag and manipulate a gun, and they were very slow in heating. The effects of this artillery are graphically described by Munro, a surgeon of McKay's Scotch regiment.

"It is thought the invention of cannon was first found at Nuremberg for the service of man; being at first, for a long time, used for battering down of walls and cities, and for counter-batteries, till at last they were used in the field to break the squadrons and battailles of horse and foot; some carrying pieces called spignards, of four foot and a halfe long, that shot many bullets at once no greater than walnuts;—and how soon the trumpet did sounde, the enemy were thundered on, first with these as with showers of hailstone, so that the enemies were cruelly affrighted with them, men of valour being suddenly taken away, who before were wont to fight valiantly and long with sword and lance, more for the honour of victory than for any desire of shedding of blood; but now men were martyrised and cut down at more than half a mile of distance by these firearms and thundering engines of great cannon that sometimes shote fiery bullets able to

¹⁸ Gui Patin, *Lettres*, who had no special regard for surgeons as a class, speaks of them in the highest terms, and adds that it was rumored that the king at the same time had sent for a good physician to govern the army hospitals. It was the custom then, and it lasted many years thereafter, for physicians to superintend the work of surgeons, there being the greatest distinction between the two.

¹⁹ From a note found among the papers of Axel Oxenstiern, dated 1632, it appears that some regiments had 12 companies and 1,787 men; others, 11 companies and 1,533 men; others, 13 companies and 1,940 men; others, 12 companies and 1,824 men. Since 1614 the company had varied from 120 to 140 men.

burne whole cities, castles, houses or bridges, where they chance to fall;—and if they happen to light within walls or amongst a brigade of foot or horse, as they did at Leipsigh on the grave Van Torne his brigadd, they spoil a number at once, as doubtless, the devilish invention did within Walestine.”

The opposing imperial infantry regiments had 6 companies of 300 men, each company having a surgeon.²⁰ One half of the soldiers had very heavy matchlocks, a forked rest 4 feet long and a sabre of the same length, the cartridges being carried in metal or wood boxes on a leather shoulderbelt;—the other half had pikes 15 to 18 feet long and swords;—both had helmets, but the pikemen had breastplates and mailed aprons as well. They were in 10 ranks. A cavalry regiment had 5 companies of 100 men each, and no surgeon is mentioned in its organization;—the *cuirasseurs* were weighted down by complete armor, a long sword and two pistols and fought in 8 ranks;—the *carabineurs* had pistols, sabres and carbines, helmets and breastplates, in 5 or 6 ranks, and the dragoons, in the same number of ranks, were like the infantry, except that they were mounted and had a lighter musket. Drills and exercises in this army were very minute and manœuvres were very slow.

At this period troops subsisted mainly on the country and plunder, but Gustavus Adolphus made efforts to deprive his campaigns of the appearance of incursions;—he combined his troops in marching, fighting and feeding, established magazines and distributed daily rations of bread and meat. There was no separate commissary officer, each general acting in that capacity. His Articles of War are very explicit, prohibiting pillage without leave under penalty

of death;—quarrels over spoils were punished by seizure of the goods, which were devoted to the “next hospital”;—civil hospitals, except when used for offensive purposes, were expressly reserved from pillage, as also churches, schools and mills;—churchmen, the aged, maids and children were shielded; ordnance, munitions of war and food were to be left for the use of the army, exempted from pillage, and one tenth of his spoil each soldier was to give to the sick and wounded in the hospitals.

Billeting was at its height, and the custom was to leave the sick, wounded, prisoners and heavy baggage in a captured town with a small garrison, the disabled to be treated in the civil hospitals. This was often difficult, as appears from an edict of the Elector John George of Saxony, for Dresden, after the battle of Leipsic, Sept., 1631, mentioned by Froehlich. Wagons were used in both armies for carrying the wounded, and an instance is related of a badly wounded prisoner being transported to Pappenheim’s quarters on two pikes.²¹

Gustavus made it a rule to gather the enemy’s wounded and bring them to camp, whence they were sent to hospitals in the neighboring towns. He was anticipated in this by Henry IV. of France during his campaign in Flanders, where he commanded besides that the wounded prisoners receive without distinction the same treatment as his own men. Indeed, the sentiment of humanity toward an afflicted enemy, though far from universal, was not uncommonly exhibited during the Thirty Years’ War, and several instances are related as anticipating in a measure the Geneva Convention. At the siege of Dömitz by the Swedes, 1631, under Colonel Lohansen, in the articles of capitulation there was one to

flight. Recent researches disprove this, for which see Baas, *Hist. of Medicine*, 17th century.

²¹ This method is mentioned in the *Chronique de Bayart* as having been offered to the *chevalier* when he received his mortal wound, but was declined.

²⁰ Some writers assert that the imperial armies had no surgeons;—all seem to base their opinion on the anecdote of Tilly being wounded at Leipsic and compelled to seek a surgeon at Halle in his

supply wagons for the transport of the sick along with the garrison retiring with the honors of war. And in 1636 there was an agreement made between John George of Saxony and the representatives of the king of Sweden at the surrender of Magdeburg, that the sick were to be left in the city and when cured to be given passes to return to their regiments. The same compact was made at Görlitz, 1641, between the same parties.

The career of Gustavus was terminated at Lützen, 1632, by a ball traversing his breast, his arm having been first broken by a bullet, which fact he hid from his soldiers. His military talents placed him among the greatest generals of this century so prolific in warriors, and his example in caring for his soldiers, sick and well, had their influence, no doubt, on his political ally, Richelieu, and others, and thus served to bring forth organized means for their welfare when disabled in action.

Epidemics of all kinds were very frequent during the century, though not always in the train of its incessant wars, yet typhus and dysentery were often due to the general misery of the people consequent on war. Scurvy principally prevailed in the armies engaged in the Thirty Years' War. Considering the opportunities of the period, it has been observed, as a curious fact, that the century was very unproductive of epidemiological works; yet there were published no less than 28 first editions on these diseases in armies, including 2 naval and 10 on particular diseases, by military authors. It is also remarkable that from the beginning of the Thirty Years' War for fifty years very little military medical literature of any kind appeared;—only 8 original works on surgery, nearly all unimportant, and 9 on diseases, out of a total for the century of 34 on surgery, in contrast with 45 for the 16th century; 2 on hygiene, 1 on the simulation of disease and 2 on medical organization. Especially

toward the end of the century were sown the seeds that made the 18th century, in this and all other respects, the most noteworthy of modern times.

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PART III.—THE EIGHTEENTH CENTURY

The Battle of Fontenoy

The administrative services for armies were of very slow and irregular growth prior to the 18th century in France, where they originated, and in other countries, notwithstanding the spirit of imitation and improvement which seems to be so universal even in our day. They then became an affair of government, and before its close, when armies assumed more of a national character, everything pertaining to the life of a soldier was of as much concern to the State as now. Popular interest, too, was excited to such an extent that, long before the French Revolution, discussions on tactical subjects were so frequent and violent in the salons of Paris that the court and fashionable world were divided into two camps. Grievous faults in organization and practice lasted through the century and remains of the old, severely criticised and generally unsuccessful methods, yet exist in some armies. Still, these services then became to the general of as great importance as his plans for a campaign. The history of their development is voluminous and very interesting to the military student. Two especially curious features

are to be observed. There is no natural order of time or succession in the births of departments, or in the evolution of the details of each, particularly of the medical, and, what appears to be a good reason for this, most advances were made by circumstances impelling individual endeavor before the State acted.

All known methods of securing men for the ranks were tried at one time or another. Voluntary enlistment was everywhere encouraged more than before, and, with the evident intent of making the soldier's position more honorable, it was declared for fixed periods, first by Venice in 1766. This had been done at times for certain purposes, as by England in 1755, for three years, but the understanding that enlistment was for life or until discharge by order, existed on all other occasions, until 1775. Marshal Saxe was a strenuous advocate of a limited period as early as 1732. In the beginning, from whatever source coming, the recruit underwent the inspection of his captain only, as to physical and other qualifications, and, consequently, there was no uniformity in this respect except as to height and age, which were prescribed by law. From 1726 to 1775 in France a medical examination began the ceremony of admitting a person in the provincial militia, from which the ranks of the army were filled according to necessity, and in 1763, to each of thirty-two regiments of recruits then organized was assigned a surgeon, who was required to inquire into the physical aptitude, in the presence of the commissary of war. In 1778 an inspector-general of recruiting for foreign service was appointed in England but there was no medical examination until 1790, and then by reason, apparently, of the complaints of regimental surgeons abroad, and no written attestation of it before the last year of the century. As early as 1745 rupture disqualified, by act of Parliament, no professional opinion being

exacted. The Prussian regulations of 1788 for the first time order real examinations by the regimental and battalion surgeons; before that date violence and deceit notoriously prevailed to fill the ranks.

Billeting, onerous to the civilian and subversive of discipline for the soldier, was the common usage until it was so modified that it was practically abolished before the end of the century.²² Although barracks, in rare instances, had been constructed in France in the previous century and a uniform type had been designed by Vauban and futile ordinances issued for their erection, they really date from the early years of the 18th century, the first, in most continental countries as well, having been built at the instance and expense of municipalities, to avert the charge of lodging from the poor inhabitants, the wealthier classes being nearly all exempted. The number of casernes was greatly increased and their plans very much improved during the reign of Louis XVI., and in 1818 their construction was assigned to the engineers. England began in 1739, by erecting low, ill-ventilated houses that bred disease, and these were used before Pitt interested the State in the matter, building large barracks to such an extent that the expense became a political issue. The obligation of cities to shelter troops was in force in Prussia as late as 1810, when the government assumed it. Regularly laid out modern camps, on the ancient Roman model, and the consequent good order of everything relating thereto, date from Martinet, whose plan Louis XIV. adopted in orders, 1667. The habitations of soldiers and their accessories was a favorite theme among writers on the Art of War,—Feuquière, Frederick the Great, Saxe, etc.,—and the hygienic de-

²² It is now legal in France, in certain cases, as during a general mobilization, when barracks would be insufficient. It was prohibited in England in 1745 except on licensed victualers, but lasted in Scotland as late as 1857.

tails were discussed by every military medical writer, especially worthy of note being Pringle, 1752, Brocklesby, 1764, Monro, 1764, and Colombier, 1772.

Nor was the sanitary condition of the soldiers neglected in the matter of clothing, the literature of the subject being meagre, however, to this day. The hair, hat, stockings, shoes, coats, breeches were all criticised in the minutest particular by Saxe, who cared more for the soldier than any other general, and gradually reformed on lines laid down by him, according to Desgenettes, his commentator. Uniformity was introduced in France 1670-1679, among the improvements of Louvois, the soldier before that time wearing a shoulder belt over a steel breastplate and ordinary dress. Its supply as a source of profit was taken from the officers in 1729,²³ yet in 1779 the war minister, St. Germain, complained that soldiers were poorly clad, more for theatrical effect, and with no reference to health. The first English regulation for clothing was issued in 1751, and Frederick William began the reform in Prussia. It was not until the French Revolution that a permanent interest became manifest and only after that period, except incidentally, by medical authors.

Every commander who recorded his experiences or opinions, from Turenne to Napoleon, including the eccentric Suwarow,²⁴ recognized the hygienic importance of food, and has something to say about it. A few, like Rutowski and Maillebois, and

French officers generally, prescribed, in marching orders, rules to govern its consumption. The standard daily allowance was 24 oz. wheat bread,²⁵ 1 lb. of meat and one pint of wine or two of beer. The bread was sometimes increased to 28 oz. and the cavalryman's ration was one-half again as large, as a rule. In England bread seems to have been issued always by contractors; there was a stoppage for it, however, while other articles were sold by officers at advanced and often exorbitant prices, and as pay was irregular, the result may be imagined. Frederick the Great instructed his generals to supply bread 2 lbs. daily, and meat 2 lbs. weekly, free during a campaign. In 1799 the issue was made in France at the expense of the government, and not deducted from the pay of the soldier. The Russian troops made their own bread long before this. Subsistence details were placed, in Richelieu's time, in the hands of civilians, who were directly under the ministers, and it thus happened that both military operations and generals were subject to them. Guibert says that this system of brigandage was at its height in 1757, and soldiers in all armies suffered from insufficient quantity and bad quality. There were no regular commissaries in England before 1787, the contract system prevailing, and even the great Marlborough was suspected of sharing profits obtained by fraud in the supply of food. The vice lasted in all countries, notwithstanding the often expressed wishes of the generals and orders of govern-

²³ The custom lasted in England until 1858.

²⁴ A book, "Discourse upon the Trigger," attributed to him, was sent by the Russian government to every regiment in the service. It contains these rules for diet. "Have a dread of the hospital. German physic stinks from afar, is good for nothing and rather hurtful. A Russian is not used to it; messmates know where to find roots and herbs. A soldier is beyond all price; take care of your health, scour the stomach when it is foul; hunger is the best medicine. If loose bowels want food, at sunset a little nourishment; for costive bowels some purging plant

in warm water or licquorice root. In high fevers eat nothing even for twelve days, but drink small beer as much as you please. In intermitting fevers, neither eat nor drink. In hospital the first day the bed is soft, the second comes French soup, and the third you are laid in your coffin; one dies and ten of his companions inhale his expiring breath. For the healthy, drink, air and food; for the sick, air, drink and food."

²⁵ Rye bread was issued in Queen Anne's time but discarded because of a notion that it caused dysentery.

ment and in spite of warnings by medical officers. The work of Lind for seamen is to be especially commended. Toward the end of the century we find such expert opinion more highly regarded, and physicians and surgeons appear on boards constituted to inquire into the subject of articles of diet. Special hospital diet did not originate until in the last half of it.

The transport service, personal cleanliness, marches, drills and exercises attracted the attention of both military and medical writers, special works and orders appearing, and all these subjects were treated more or less under the now very common head of means of preserving the health of soldiers.

This growing general interest in military sanitary matters greatly improved the condition of the soldier, and when they became a part of the duty of medical officers the position of these was more elevated and respected. Only physicians who were University graduates, and surgeons, were at first considered of sufficient importance to be given the rank and uniform of officers, but before the beginning of the 19th century, assistants, mates, etc., were commissioned, and surgeons were considered the equals of physicians. Officers of the line like Robert Jackson transferred to the medical staff, and from the medical staff, like Charles Bisset, to the engineers. Hospital affairs began to be governed like military, the French in 1718 setting the example by the adoption of medical regulations establishing discipline, defining duties and exacting reports; then followed a system of inspections and the creation of a department with a chief subordinate directly to the minister of war. Probably the first English regulations were issued in 1762 by Robert Gordon at Winchester camp with the approval of Brocklesby. To meet the demands of new responsibilities it soon became apparent that a special training was needed, and schools were founded, in France at army and naval hospitals, 1718,

separate and elaborated amphitheatres, 1775, in Saxony, 1748, as a part of the Collegium Medico-Chirurgicum of Prussia, 1719, distinct in 1795, and in Austria, the Josephinum, 1784. How much of this was due to individual effort is shown by the fact that Desoteux established, with the aid of his colonel, a school of surgery in his regiment that became celebrated; it had regularly about sixty pupils, many of whom became distinguished surgeons and even professors in the faculty. And in 1766, through the exertions of Richard de Haute-sierck, inspector of hospitals, appeared in France the first journal devoted exclusively to military medicine, though before this Schaarschmidt and Henkel, military physicians, edited publications on medical matters in general, the former from 1708 to 1749, the latter from 1747 to 1772. But the greatest and most beneficial institution of the century was the *Academie royale de Chirurgie*, founded 1731, at the instigation of de la Martinière. Five of its seven officers, and one-half of the forty members nominated by the king, and of the associate members, were prominent military surgeons who served in the field, and more than one-third of the authors of papers and observations contained in 4 volumes of memoirs, 1743-68, were in the army or navy.

With the exception of the last decade, which was the most eventful, brilliant and fertile epoch in the entire history of military medicine, the most interesting period of the century is that between the origin of the Academy and the publication of the second volume of its transactions in 1753. Within this period were conceived, signed and operated the celebrated articles affecting the neutrality of hospitals, between Lord Stair and the Duke de Noailles. The official correspondence of the latter with his king and d'Argenson, the minister of war, credit the first suggestion to Stair, but there is good authority for the belief that Pringle, chief physician of the English

army, inspired the proposition, many circumstances after the battle of Dettingen, 1743, bringing about a favorable condition of mind in both armies. With the campaign ended the agreement;—a similar arrangement for all time was advocated by Monro, Peyrilhe, Percy, surgeons, and Chamousset, intendant-general, and proposed on occasions, as by Moreau to the Austrian General Kray. In 1820 the subject was revived, and again in 1864 by Henri Dumant, a Geneva philanthropist, and it resulted finally in the adoption of the present articles. During this time the number of permanent military hospitals in France increased rapidly; there was established the first special hospital for officers and soldiers at the hot springs of Bourbonne; new regulations encouraging the spirit of detail and subordination in all these institutions were promulgated, and the selection of the personnel and its payment were first made by the State. In the English army in active service abroad, hospital comforts were supplied so far beyond anything heretofore extended to the soldiers that there arose a lengthy correspondence between the Duke of Cumberland and the home authorities with reference to the additional expenditure incurred. Humanity, Fonblanque says, had not yet become an element in British military economy. Austria, Prussia, Denmark and Sweden attempted the introduction of the French system of hospitals in their armies. Questions in surgery began then to be discussed in a comprehensive and scientific manner, as never before, the battle-fields of Dettingen and Fontenoy especially furnishing ample material from which practical deductions were made by many surgeons, and their differences brought to light details that single individual experience had failed to give to the world. Then, too, was first formed the germ of an organization for the prompt relief of wounded on the field, that finally developed into the present ambulance system.

The Marquis de Feuquière has much to say concerning the administration of fixed and movable hospitals at the beginning of the century. He mentions nothing similar to what took place, probably for the first time, at Fontenoy. Randby, the last royal household surgeon to be present with the English king in active service, is credited with the first suggestion, but he made it after Dettingen, in the form of a recommendation, and I can find no such actual organization in the British army before 1748, when are mentioned flying, fixed and also convalescent hospitals. The custom was, as described in Marlborough's time, to extend the order of battle in front of the tents, behind which were placed the surgeons to await the arrival of the wounded. Both English and French generals complained of the sick and wounded interfering with military movements during and after an engagement. Randby's project was, that when an army was ranged for battle, the surgeon-majors of three or four regiments posted side by side, should unite with their assistants under the same tent, taking station at the rear guard, according to the orders of the general:—the wounded were to be carried to these points, and by these means the surgeons could assist each other and do their duty with diligence and exactitude. He then deplores the actual method of carrying wounded from point to point without any system and much to their detriment.

We are indebted to Bagieu, a distinguished French military surgeon, for a few scant particulars, which are given casually for the purpose of elucidating a surgical question. He says that "in battles there is an ambulance hospital, more or less within reach of the place where an engagement occurs, where the surgeon-major and other surgeons hold themselves in readiness. This is the first depot where wounded are collected, from whence they are carried to hospitals in the nearest towns, and thence

to cities farther removed when these become crowded. It is rare that surgical operations are performed on the field proper, that is, at the place where wounds are inflicted, and still more rare are amputations performed. The light wounded betake themselves to the ambulance station, the dangerously wounded are carried there on litters."

The place occupied by the ambulance is thus described: "Sometimes, as at Fontenoy, it is in the open field, commonly it is in some village, more rarely in the cities, and nearly always sufficiently distant from the place of combat." He also discusses litters, mentions a horse litter improvised by the great surgeon, J. L. Petit, praises transportation by water, accomplished on a considerable scale after Dettingen, and gives the detailed structure of a wagon specially designed for carrying wounded.

With the aid of other writers the arrangements at Fontenoy can be pictured.

The contending forces, allied English, Dutch, Hanoverians and Austrians, 55,000, and the French, 60,000, were organized very much alike; foot battalions of five companies containing 100 to 140 men each, two to four battalions making a regiment numbering 1,000 to 2,700 men, the English battalions being slightly largest; cavalry, in squadrons of about 100 men each. As at this time each infantry regiment had a surgeon and mate or assistant, it is estimated that the allies had about forty regimental medical officers, the French as many; the cavalry of both armies had none. There was on both sides a small number of physicians, one usually to a garrison of about 10,000 men, and army surgeons. The infantry were armed with flintlock muskets and bayonets, the sword having been abandoned about this time, and they worked the field pieces of artillery, the largest mentioned being a battery of six 16-pounders on the bank of the River

Scheldt opposite the field, to cover the retreat of the French king. All arms were engaged at one time or another, the artillery opening the battle, and at the critical moment, supported by cavalry, saving the day for the French, an occurrence said to have been the first combination of the two arms in history.

With the village of Fontenoy toward the right of the French centre, the length of the line that bore the brunt of the battle was about 1,200 yards, and the width, of what was practically a closed field, was 2,000 yards. The point where the English and Hanoverians massed their attack was on the left of the village, including it eventually, and it was here that the terrible slaughter of the French infantry nearly won a victory for the allies. Surgeons were posted on the first line, as is proved by the fact that while the English were advancing on the regiment stationed nearest Fontenoy, the French lieutenant-general Luttaux was wounded, and his aide implored him to have his wound first dressed before going to report to the king. The regiments of Hainaut and Dillon were, in the beginning, on the French left, and which moving toward the centre to stay the English by an attack in the flank, lost heavily. It is stated by Boucher that on the field itself amputations were performed on wounded of these regiments, it is inferred, at the ambulance hospitals, which were, at the furthest, about 2,000 yards from the front line. After the battle these ambulances were evacuated and the wounded carried on caissons and carts to cities in the rear, principally to Lille, 16 miles, and Douai, 20 miles distant, where an immense number of surgical operations were performed at hospitals established for the purpose, the civil hospitals, churches and private houses being used.²⁶

²⁶ The following members or associates, or contributors to the transactions, of the French Academy of Surgery were present: Boucher at Lille, where his conduct is mentioned as beyond praise, Geraud,

A battle begun with an exchange of fencing master's compliments ought to have terminated by an exhibition of practical philanthropy, and Voltaire says that in these hospitals no comfort was wanting for the wounded French or their prisoners. The zeal of civilians and soldiers was such that the surgeons were obliged to interfere, and the hospitals were so well managed that officers preferred to be treated there. The allies carried 600 wounded twenty miles, to Ath, where a hospital was established in the casernes; they left 1,200 in the hands of the French, who had of their own 4,000. Here then, at Fontenoy, May 11, 1745, wounded soldiers were treated on the first line by regimental surgeons; they were collected at ambulance stations, where capital operations were performed, then transferred to hospitals prepared for them in near cities, and, when these became overcrowded, to cities further away. A few months after this battle, Maillebois conducted an army into Italy, his chief physician being Baron, who was subsequently dean of the Faculty of Paris, and in nearly every daily order for marching and camping is designated a place for the hospital *ambulant*, usually on the march in rear of the artillery with the treasure and provisions. The day before the battle of Bassignano, September 27, 1745, three ambulance hospitals were organized, one for each col-

Guffroy, Pollet, Guerin, Vandergracht, Theri at field hospitals, Faure and Read at Valenciennes. Garengot was, I presume, with his regiment, *du Roi*, one of those at the centre of the conflict; An-

umn, and ordered to take station at villages, each about 1,200 yards in rear of the line of battle on the river Tanaro, where an engagement was expected. Two of these hospitals actually united opposite the centre of the line, which covered ground about 6,000 yards long. And in the "Art of War," by the Maréchal de Puységur, published in 1749, a map for illustration shows the ambulance about 2,500 yards in rear of the first line. Excepting an untried project of Ravaton, very little improvement, on Randby's outline and Bagieu's account, took place subsequently until Larry and Percy made their names immortal, not only for the invention of details to rapidly relieve and remove wounded soldiers during battle on a scale never equalled, but for their inestimable contributions to operative military surgery.

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douillé had charge of the whole system of evacuation of wounded on cities of the north of France; Ravaton was at one of these, and La Peyronie, its President, operated on the field.

A CHECK LIST OF MEDICAL INCUNABULA

IN THE SURGEON GENERAL'S LIBRARY, WASHINGTON, D. C., 1918

THE following check list of incunabula in the Surgeon Generals Library is compiled not only for the convenience of the library, to enable us to state at a glance what it possesses of early printed books, but also in the interest of the students of medical history. The list does not make a pretentious claim to bibliography.

Dr. Arnold C. Klebs has in preparation a bibliography of all medical incunabula, including those in our library and those in other American libraries, in which the entries will be given in full.

As I have already stated in my paper "On Incunabula," published in the *Bulletin of the Medical Library Association*, N. S., Vol. V, No. 1 (July, 1915), the first attempt at listing medical incunabula was made by the late J. Stockton Hough of Trenton, New Jersey.

It cannot be the aim of our library, just as it cannot be the aim of any library, no matter how large its endowment or appropriation, to own all the incunabula in existence, especially when one takes into account the fact that there are about 28,000 of these rare volumes, and that in some instances only a few copies have been preserved and in some, only one. Prof. Karl Sudhoff, of Leipzig, estimated the number of medical incunabula at about 2,000. We are inclined to place the number much lower, but refrain from giving any approximate figure.

Early printed books must be judged from two points of view; first, from the standpoint of the intrinsic value of the book itself, and, second, from a bibliographical standpoint. This must be the guiding principle for a special library like ours, when making a collection of incunabula. If possible, every printer and every town should be represented by a good specimen dealing with the subject in which the library in question is most interested.

On this principle the incunabula for the library of the Surgeon General's Office were collected; notwithstanding the limited means I have tried to enlarge our collection of early printed books and during my ad-

ministration have succeeded in increasing the number of our incunabula.

This list is published in the *ANNALS OF MEDICAL HISTORY* to give the material a wider circulation among readers of medical literature. I hope that other lists of the medical incunabula available in public and private libraries may be presented to the public through this medium so that the files of the *ANNALS* will eventually contain a complete bibliography of the medical incunabula in this country.

CHAMPE CARTER McCULLOCH
Librarian

LIST OF INCUNABULA

1. ABIOSUS, JOANNES. *Trutina rerum cœlestium et terrestrium*. [Venezia, JOANNES RUBEUS, a. 5 February, 1498.] Quarto.
Reichling, IV, p. 97. Hain 25.
2. ABRAHAM BEN EZRA. *De nativitatibus*. Venezia, ERHARD RATDOLT, 24 December, 1485. Quarto. Bound with: *Prognosticon*, etc. Venezia, 1485.
Hain-Copinger * 21. Proctor 4407. Pellechet 16. Walters p. 2. Redgrave 46.
3. ABULCASIS. *Liber servitoris*. Venezia, NICOLAS JENSEN, 1471. Quarto. Bound with: NICOLAUS. *Antidotarium*. Pellechet 411. Proctor * 4075.
4. ÆGIDIUS CORBOLIENSIS. *De pulsibus*. Commentator: GENTILIS DE FULGINEO. Editor: AVENANTIUS MUTIUS DE CAMERINO. Padova, MATTHÆUS CERDONIS, January, 1484. Quarto.
Hain * 103. Pellechet 64. Proctor 6815.
5. ÆGIDIUS CORBOLIENSIS. *Carmen de urinis cum commentario*. Carmen de pulsibus. Commentator: GENTILIS DE FULGINEO. Editor: AVENANTIUS DE CAMERINO. Venezia, BERNARDINUS DE VITALIBUS, 16 February, 1494. Quarto.

- Hain * 101. Pellechet 62. Proctor 5522.
Imperfect.
6. ALBERTUS MAGNUS. Liber aggregationis de virtutibus herbarum. [*Antwerp*, MATHIAS VAN DER GOES, c. 1486.] Quarto.
Campbell's Annales 80+Supp. II, *80
Burger p. 418.
 7. ALBERTUS MAGNUS. De animalibus. *Venezia*, JOANNES & GREGORIUS DE GREGORIIS, 21 May, 1495. Folio.
Hain * 547. Pellechet 341. Proctor 4541.
 8. ALBERTUS MAGNUS. Liber aggregationis de virtutibus herbarum. [*Speier*, CONRAD HIST, or EICHSTATT; MICHAEL REYSER.] Quarto.
Pellechet 343.
 9. ALCANÍS, LUIS. Regiment preservatiui e curatiui de la pestilencia. [*Valencia*, NICOLAUS SPINDELER, c. 1490.] Quarto.
Undescribed.
 10. ALEXANDER OF APHRODISIAS. Problemata. Latin translation by GEORGIUS VALLA. ARISTOTELES: Problemata. PLUTARCH: Problemata. *Venezia*, ANTONIUS DE STRATA, 24 November, 18 December, 1488—3 January, 1489. Folio.
Hain-Copinger * 658. Pellechet 439.
Voullième Berlin 3917. Proctor 4594.
 11. ALFONSUS BONI HOMINIS. Libellus arabicus contra malos medicos. Editor: JOANNES ELISIUS NEAPOLITANUS, 1500. Quarto.
 12. ALMENAR, JOAN. De morbo gallico. *Venezia*, 1502. TORRELLA, CASPAR. De dolore cum tractatu de ulceribus in pudendagra. *Roma*, JOHANN BESICKEN with MARTIN OF AMSTERDAM. 31 October, 1500. Quarto.
Proctor 4000. Hain-Copinger 15559.
Voullième Berlin. 3547.
 13. ARCANA. Arcana Medicinæ. [*Genève*: LOUIS CRUSE, c. 1490.] Quarto.
Pellechet 1105.
 14. ARCULANUS, JOANNES. Expositio in Avicennæ canonis quarti Fen primam. *Ferrara*, ANDREAS BELFORTIS. 24 January, 1489. Folio.
Hain 1552. Burger p. 340. Reichling II, p. 118.
 15. ARCULANUS, JOANNES. Practica seu expositio in IX librum Rhazis ad Almansorem. *Venezia*, BERNARDINUS STAGNINUS, 12 November, 1493. Folio.
Hain-Copinger * 13899.
 16. ARCULANUS, JOANNES. Expositio in Avicennæ canonis quarti Fen primam. *Venezia*, BONETUS LOCATELLUS, 27 October, 1496. Folio. Bound with Gian Matteo Ferrari da Grado, 1502.
Hain-Copinger * 1553. Collijn Upsala 788.
 17. ARCULANUS, JOANNES. Practica seu expositio in IX librum Rhazis ad Almansorem. *Venezia*, BONETUS LOCATELLUS for OCTAVIANUS SCOTUS, 18 September, 1497. Folio.
Hain-Copinger * 13900. Burger p. 482.
 18. ARGELLATA, PETRUS DE. Chirurgia. *Venezia*, BENEDICTUS OF GENOVA, 9 August, 1480. Folio.
Proctor 4596. Pellechet 1161. Hain 1635. Reichling IV, p. 120.
 19. ARGELLATA, PETRUS DE. Chirurgia. *Venezia*, [JOANNES & GREGORIUS GREGORIIS], 12 September, 1499. Folio. Bound with: ALSAHARAVIUS. Liber theoricæ nec non practicæ, 1519.
Hain 1639. Copinger III, 241. Proctor 5703. Reichling IV, p. 121.
 20. ARISTOTELES. Opera. [Latin.] [4 parts.] *Augsburg*, AMBROSIIUS KELLER, 15 September—21 October, 1479. Folio.
Hain * 1658 [4]. Pellechet 1176.
British Museum Catalogue II, 361 [I—III]. Voullième Berlin 195—197.
Proctor 1747—1749.
 21. ARISTOTELES. Problemata. Addition: De vita et morte Aristotelis. [*Cöln*, HEINRICH QUENTELL. c. 1490—1495.] Quarto. Woodcut.
Hain * 1721. Pellechet 1220. Proctor 1410. Burger p. 552. British Museum Catalogue I, p. 281.
 22. ARNOLDUS DE VILLANOVA. Tractatus de venenis. Addition: VALASCUS DE TARANTA. De epidemia et peste.

- [*Mantova*, JOHANN BURSTER & THOMAS OF HERMANNSTADT. 1473.] Quarto. Hain-Copinger * 1805. Pellechet 1307. Proctor 6884.
23. ARNOLDUS DE VILLANOVA. *Practica*. [*Pavia*, ANTONIUS CARCANUS, c. 1482.] Folio. Bound with: ANTONIO GUAINERI. *Opera medica*. *Pavia*. Copinger II, 647. Collijn Stockholm 103.
24. ARNOLDUS DE VILLANOVA. *Practica medicina*. *Venezia*, BAPTISTA DE TORTIS, 21 February, 1494. Folio. Hain * 1801. Proctor 4646. Burger p. 614.
25. ARNOLDUS DE VILLANOVA. *Practica*. *Venezia*, OTINUS DE LUNA, 21 October, 1497. Folio. Bound with: RHAZES. *Opera varia*. [*Venezia*,] BONETUS LOCATELLUS, 1497. Hain Copinger * 1802. Pellechet 1275. Proctor 5606. Burger p. 487.
26. ARNOLDUS DE VILLANOVA. *De virtutibus herbarum*. *Venezia*. SIMON [DE GABIS] BEVILAQUA. 14 December, 1499. Quarto. Numerous woodcut illustrations [colored]. Hain * 1807. Pellechet 1315. Proctor 5415.
27. ARNOLDUS DE VILLANOVA. *Opera*. Letter: THOMAS MURCHIUS OF GENOA. *Venezia*, BONETUS LOCATELLUS for the heirs OCTAVIANUS SCOTUS, 19 January, 1505. Folio. Bound with this: DINUS DE GARBO. *Gentilis de Fulgineo*, *Gentilis de Florentia*: *Expositio partium quarti canonis Avicennæ*. Additions: DINUS DE GARBO. *Tractatus de ponderibus et mensuris*. *Compilatio emplastrorum et unguentorum*. *Venezia*, JOHANN HERZOG for ANDREA DE TORRESANI, 4 December, 1499. Folio. Hain * 6168. Pellechet 4252. Proctor 5203.
28. ARTICELLA. *Seu thesaurus operum medicorum antiquorum*. Editor: FRANCISCUS ARGILAGNES. *Venezia*, BAPTISTA DE TORTIS, 20 August, 1487. Folio. Hain-Copinger 1870. Pellechet 1378.
29. ARTICELLA. *Seu thesaurus operum medicorum antiquorum*. Editor: GREGORIUS A VULPE. *Venezia*, BONETUS LOCATELLUS for OCTAVIANUS SCOTUS. [20 December, 1492.] Folio. Reichling App. IV, p. 124. Pellechet 1379. Hain 1872.
30. AUGUSTIS, QUIRICUS DE. *Lumen apothecariorum*. [*Lyon*: MATHIEU HUSZ, a. 15 November, 1491.] Folio. Hain * 2116. Pellechet 1595. Burger p. 442.
31. AVENZOAR. *Libri Theizir Averroes* Colliget. *Venezia*, JOANNES & GREGORIUS, 4 January, 1490. Folio. Hain * 2186. Proctor 4513. Pellechet 1952. Hain-Copinger 7501. Pellechet 5003. Proctor 4508.
32. AVENZOAR. *Libri Theizir Averroes* Colliget. *Venezia*, BONETUS LOCATELLUS for OCTAVIANUS SCOTUS, 31 May, 1496. Folio. Pellechet 1653. Hain-Copinger. 2187.
33. AVICENNA. *Canonis medicinæ libri V*. Translated by GERARD OF CREMONA. *Libellus de viribus cordis*. Translated by ARNOLD OF VILLANOVA. *Padova*, [Johann Herbolt], 19 August, 27 August, 27 October, 6 November, 1479. Folio. Hain-Copinger * 2202. Pellechet 1661. Proctor 6800.
34. AVICENNA. *Canonis medicinæ libri V*. Translated by GERARD OF CREMONA. *Libellus de viribus cordis*. Translated by ARNOLD OF VILLANOVA. *Cantica*, with commentary of Averroes. Translated by ARMENGAUD [BLASIUS] OF MONTE PESSULANA. *Venezia*, PIERRE MAUFER with NICOLAUS DE CONTENGO OF FERRARA. 1482-3. Folio. Copinger III, p. 243. Hain 2203. Pellechet 1662.
35. AVICENNA. *Canon*. *Venezia*, PIERRE MAUFER CUM SOCIIS, 10 June, 1486. Quarto. Hain-Copinger * 2205. Proctor 4602. Pellechet 1664.
36. AVICENNA. *De animalibus* [Aristoteles]. [*Venezia*, JOANNES & GREGORIUS DE GREGORIIS, 1500.] Folio.

- Hain-Copinger * 2220. Pellechet 1672. Proctor 4563.
37. AVERROES. Liber colliget. *Venezia*, LAURENTIUS DE VALENTIA [DE RUBENS,] ET SOCIJ, 5 October, 1482. Folio. Hain * 2189. Burger p. 570. Pellechet 1655. [diff.]
 38. BAGELLARDUS, PAULUS. De infantium ægritudinibus. *Padova*, BARTHOLOMÆUS DE VALDIZOCCHO & MARTINUS DE SEPTEMARBORIBUS, 21 April, 1472. Quarto. Hain * 2244. Pellechet 1688. Proctor 6756.
 39. BAGELLARDUS, PAULUS. De ægritudinibus infantium. [Padova,] MATTHEUS [CERDONIS] DE WINDISCHGRETZ, 10 November, 1487. Quarto. Reichling I, p. 99. Hain 2245.
 40. BARTHOLOMÆUS ANGLICUS. De proprietatibus rerum. [Basel, BERTHOLD RUPPEL, Not after 1468.] Folio. Hain-Copinger * 2499. Pellechet 1866. Proctor 7452. Burger p. 574.
 41. BARTHOLOMÆUS ANGLICUS. De proprietatibus rerum. *Strassburg*, [PRINTER OF JORDANUS OF QUEDLINGBURG,] 11 August, 1491. Folio. Hain-Copinger * 2509. Pellechet 1875. [Flach.] Proctor 665. Burger p. 329.
 42. BARTHOLOMÆUS DE PISIS. Epitoma medicinæ. [Firenze, LORENZO MORGIANI & JOHANN PETRI.] Quarto. Pellechet 1896. Hain-Copinger 2531.
 43. BARZIZIUS, CHRISTOPHORUS. Introductorium ad opus practicum medicinæ, cum commentario in IX librum Rhazis ad Almansorem. Corrector: PETRUS BUCIUS. *Pavia*, ANTONIUS CANANUS, 20 August, 1494. Folio. Hain * 2666. Pellechet 1975. Proctor 7066.
 44. BAVERIUS DE BAVERIIS, [Joannes]. Consilia medica. *Bologna*, FRANCISCUS [PLATO] DE BENEDICTIS, 5 November, 1489. Folio. Pellechet 2010. Proctor 6589. Hain-Copinger 2712.
 45. BENEDICTUS, ALEXANDER. De observatione in pestilentia. *Venezia*, JOANNES & GREGORIUS DE GREGORIIS, 29 July, 1493. Quarto. Hain-Copinger * 807. Pellechet 456. Proctor 4530.
 46. BENEDICTUS DE NURSIA. De natura rerum et valetudine conservanda. *Roma*, JOANNES PHILIPPUS DE LIGNAMINE, 14 January, 1475. Quarto. Hain * 11919. Burger p. 478.
 47. BENEDICTUS DE NURSIA. De conservatione sanitatis. *Bologna*, DOMINICUS DE LAPIS, 1477. Quarto. Hain * 11920. Proctor 6536. Voulliéme Berlin 2735.
 48. BENEDICTUS DE NURSIA. De conservatione sanitatis. [Roma, STEPHEN PLANCK.] Quarto. Copinger II, 4444. Proctor 3768.
 49. BEROALDUS, PHILIPPUS. Declamatio an orator sit philosopho et medico anteponeendus. *Bologna*, BENEDICTUS HECTORIS FÆLLI, 13 December, 1497. Quarto. [Undescribed].
 50. BRUNTSCHWIG, HIERONYMUS. Buch von der pest. *Strassburg*, JOHANN GRÜNINGER, 18 August, 1500. Folio. Numerous woodcut illustrations. Hain * 4020. Pellechet 3040. Proctor 495.
 51. CANDIDUS, PETRUS DECEMBRIUS. De genitura hominis. [Roma, STEPHANUS PLANCK, c. 1490.] Quarto. Reichling I, 104. Proctor 3772. Burger p. 542.
 52. CASTELLO, TURAN DE. De balneis. *Sant[or]so*, JOHANNES DE RENO, 24 March, 1473. Quarto. Hain * 4592=Hain 7571. Burger p. 560.
 53. CELSUS, AURELIUS CORNELIUS. De medicina. *Firenze*, NICOLAUS LAURENTII, 1478. Folio. Hain-Copinger * 4835. Proctor 6116. Burger p. 464.
 54. CELSUS, AURELIUS CORNELIUS. De medicina. *Milano*, LEONARDUS PACHEL & ULDERICUS SCINZENZELER, 1481. Folio. Pellechet 3465. Proctor 5940. Burger p. 516. Hain-Copinger 4836.

55. CELSUS, AURELIUS CORNELIUS. De medicina. Addition: GALEN. De affectorum locorum. [Venezia, JOHANNES HAMMAN, 1500.] Venezia, JOHANNES RUBEUS, 8 July, 1493. Folio. Hain-Copinger * 4837. Pellechet 3466. Proctor 5134.
56. CELSUS, AURELIUS CORNELIUS. De medicina. Venezia, PHILIPPUS PINZIUS, 6 May, 1497. Folio. Hain-Copinger * 4838. Pellechet 3467. Proctor 5316.
57. CHIROMANTIA. Chiromantia ex divina philosophorum academia. Venezia, BERNARDINUS DE BENALIUS, October, 1493. Quarto. Woodcuts. Reichling IV, p. 188. Hain-Copinger 4976.
58. Descriptiones Morborum. Descriptiones morborum in corpore humanorum. Addition: ARNOLDUS DE VILLANOVA. Tractatulo de virtutibus quercus. [Memmingen, ALBRECHT KUNNE,] 1496. Quarto. Hain * 6096. British Museum Catalogue II, 606. Proctor 2798.
59. DESPARTS, JACQUES. Summula super remediis ex Mesue libris. Lyon, [JOANNES TRECHSEL, c. 1500]. Octavo. Copinger, II, 6609. Hain 12425. Reichling, III, p. 132.
60. DINUS DE GARBO. Expositio partium quarti canonis Avicennae. Ferrara, ANDREAS DE BELFORTIS, 27 October, 1489. Folio. Hain * 6166. Pellechet 4250. Burger p. 340.
61. DINUS DE GARBO. Compilatio emplastrorum et unguentorum. Ferrara, ANDREAS DE BELFORTIS, 28 October, 1489. Folio. Bound with his Expositio. Hain * 6170. Pellechet 4253. Burger, p. 340.
62. DINUS DE GARBO. Tractatus de ponderibus et mensuris. Compilatio emplastrorum et unguentorum. Venezia JOHANN HERZOG for ANDREA DE TORRESANI, 4 December, 1499. Folio. Hain * 6168. Pellechet 4252. Proctor 5203.
63. DINUS DE GARBO, GENTILIS DE FULGINEO, GENTILIS DE FLORENTIA. Expositio partium quarti canonis Avicennae. Additions: DINUS DE GARBO. Tractatus de ponderibus et mensuris. Compilatio emplastrorum et unguentorum. Venezia, JOHANN HERZOG for ANDREA DE TORRESANI, 4 December, 1499. Folio. Hain * 6168. Pellechet 4252. Proctor 5203.
- SILLANUS DE NIGRIS. Expositio in IX Librum Rhazis ad Almansorem. Addition: PETRUS DE TUSSIGNANO. Recepta Rhazis. Venezia, OTINUS DE LUNA, [21 July,] 1497. Folio. Hain-Copinger * 13897. Proctor 5605.
64. DINUS DE GARBO. Gentilis de Fulgineo; Gentilis de Florentia; Expositio partium quarti canonis Avicennae. Additions: DINUS DE GARBO. Tractatus de ponderibus et mensuris. Compilatio emplastrorum et unguentorum. Venezia, JOHANN HERZOG for ANDREA DE TORRESANI, 4 December, 1499. Folio. Hain * 6168. Pellechet 4252. Proctor 5203.
65. DONDI, GIACOMO DEI. Aggregator. [Strassburg, ADOLPH RUSCH, c. 1470.] Folio. Hain-Copinger * 6395. Pellechet 4435. British Museum Catalogue I, p. 64. Proctor 248. Voullième Berlin 2119.
66. FALCUCCI, NICCOLO. Sermones medicinales VII. [4 volumes.] Venezia, BERNARDINUS STAGNINUS, 24 December, 1490—8 October, 1491. Folio. Hain * 11768.
67. FICINO, MARSILIO. De triplici vita. Venezia, [BARTHOLOMEO OF CAPO D'ISTRIA.] 1498. Quarto. Proctor 5639. Hain * 7066. Burger p. 530. Günther Leipzig 3112.
68. FIERA, BAPTISTA. Cœna seu de ciborum virtutibus. [Roma, EUCHARIUS SILBER, c. 1484.] Quarto. Reichling II, p. 169. Hain 7084. Copy II.
69. GADDESSEN, JOHN OF. Rosa anglica practica medicinæ. Pavia, LEO-

- NARDUS GERLA, 24 January, 1492. Folio.
- Hain-Copinger * 1108. Pellechet 764. Proctor. 7106.
70. GALEN. Opera. Venezia, PHILIPPUS PINZIUS, 27 August, 1490. Folio. Hain * 7427. Pellechet 4975. Burger p. 537. Günther Leipzig 3535.
71. GALEN. De affectorum locorum notitia. [Venezia, JOHANNES HAMMAN (HERTZOG), 1500.] Folio. Bound with: CELSUS. De medicina. Venezia, RUBENS, 1493. Hain 7428. Burger p. 430.
72. Gart der Gesundheit. Maintz, PETER SCHÖFFER, 28 March, 1485. Folio. Numerous colored illustrations. Proctor 123. Hain * 8948. Voullième Berlin 1542. Imperfect.
73. GAZIO, ANTONIO. Corona florida medicinæ. Venezia, JOANNES & GREGORIUS DE GREGORIIS, 20 June, 1491. Folio. Bound with this: AVENZOAR. Libri Theizir Averroes Colliget. Venezia, JOANNES & GREGORIUS DE GREGORIIS, 4 January, 1490. Folio. Hain * 2186. Proctor 4513. Pellechet 1652. Hain-Copinger * 7501. Pellechet 5003. Proctor 4518.
74. GEMINIANO, JOANNES DE SANCTO. Liber de exemplis et similitudinibus rerum. Venezia, JOANNES ET GREGORIUS DE GREGORIIS, 12 July, 1499. Quarto. Hain-Copinger * 7547. Proctor 4560.
75. GENTILIS DE FULGINEO. Super fen unum quarti canonis Avicennæ de febre et de majoritate morbi. Padova, NICOLAUS PETRI DE HARLEM, 19 February, 1476. Folio. Pellechet 5025. Reichling I, p. 147. Burger, p. 533. Hain 7565.
76. GENTILIS DE FULGINEO. Consilium contra pestilentiam. [Colle, BONUS GALLUS, 1478-9.] Quarto. Pellechet 5021. Reichling II, 530.
77. GENTILIS DE FULGINEO. Tractatus de febribus. Padova, MATTHÆUS CERDONIS 2 December, 1486. Folio. Copinger II, 2653.
78. GERSON, JOANNES DE [CHARLIER]. De pollutione nocturna et diurna. De cognitione castitatis. Forma absolutionis sacramentalis. [Cöln, ULRICH ZELL, c. 1467.] Quarto. Hain 7697 + Hain * 7690 [Hain-Copinger 7704.] Pellechet 5212 + Pellechet 5135. Proctor 806 + Proctor 807.
79. GERSON, JOANNES DE [CHARLIER]. De pollutione nocturna et diurna. De cognitione castitatis. [Cöln, LUDWIG OF RENCHEN.] Quarto. Hain * 7701. Proctor 1275. Burger p. 559. Imperfect.
80. GORDON, BERNARDUS DE. Practica dicta Lilium medicinæ. Ferrara, ANDREAS BEAUFORT, 18 May, 1486. Folio. Hain-Copinger * 7796. Pellechet 5274. Proctor 5749. Addition: Manuscript.
81. GORDON, BERNARDUS DE. Practica dicta Lilium medicinæ. Lyon, ANTONIUS LAMBILLON ET MARINUS SARASIN, 2 May, 1491. Folio. Pellechet 5275. Burger p. 461. Hain-Copinger 7797.
82. GORDON, BERNARDUS DE. Practica dicta Lilium medicinæ. Venezia, JOANNES & GREGORIUS DE GREGORIIS, 16 January, 1496. Quarto. Hain * 7799. Pellechet 5276. Proctor 4551.
83. GORDON, BERNARDUS DE. Practica dicta Lilium medicinæ. Venezia, BONETUS LOCATELLUS, 22 December, 1498. Folio. Hain * 7800. Pellechet 5277. Proctor 5095. Voullième Berlin 4200.
84. GRADO, GIAN MATTEO FERRARI DA. Practica. Pavia, [JOANNES DE SIDRIANO,] 29 September, 1471. Folio. Reichling II, p. 177. Hain † 7836.
85. GRADO, GIAN MATTEO FERRARI DA. Super XXII fen tertii canonis Avicennæ. Milano, JACOBUS DE SAN NAZARRO, 17 November, 1494. Folio.

- Hain * 7840. Pellechet 5286. Burger p. 575.
86. GRADO, GIAN MATTEO FERRARI DA. Opera medica, seu practica cum textu libri noni Rhazis ad Almansorem. *Venezia*, BONETUS LOCATELLUS for the heirs of OCTAVIANUS SCOTUS, [12 June,] 1502. Folio. Bound with this: ARCU- LANUS, JOHANNES. Expositio in Avicennæ canonis quarti Fen primam. *Venezia*, BONETUS LOCATELLUS, 27 October, 1496. Folio.
Hain * 1553. Collijn Upsala 788.
87. GRASSI, BENEVENUTO. De oculis. [Ferrara, SEVERINUS DE FERRARA, 1474.] Quarto.
Pellechet 5300. Reichling II, p. 179. Burger p. 398. Hain 7869.
88. GRÜNPECK, JOSEF VON BURCK- HAUSEN. De pestilentiali scorra sive mala Franzos. [Cöln, CORNELIS DE ZIERIKZEE.] Quarto. Two illustrations.
Hain * 8092. Proctor 1501. Burger p. 655.
89. GUAINERI, ANTONIO. De propriis mulierum ægritudinibus. [Padova, CONRAD DE PADERBORN.] 1474. Quarto.
Reichling II, p. 182. Burger p. 517. Hain-Copinger 8104.
90. GUAINERI, ANTONIO. Opera medica. Addition: De febribus. De balneis. *Pavia*, ANTONIUS CARCANUS, 1481. Folio.
Reichling V, p. 130. Burger p. 371. Hain 8097.
91. GUAINERI, ANTONIO. Opera medica. Addition: ARNOLDUS DE VILLANOVA. Practica. [Pavia, ANTONIUS CARCANUS.] Copinger II, 647. Collijn Stockholm 103. *Pavia*, ANTONIUS CARCANUS, 10 January, 1488. Folio.
Hain-Copinger * 8098. Proctor 7057.
92. GUAINERI, ANTONIO. De febribus. [Padua, CONRAD DE PADERBORN.] Folio.
Reichling II, p. 183. Copinger II, 2803. Burger p. 517.
Bound with 2 other works of Guaineri.
93. GUY DE CHAULIAC. Chirurgia. *Venezia*, NICOLAUS GIRARDENGUS, 2 November, 1480. Folio.
Copinger II, 1548. Reichling II, p. 146. Burger p. 417.
94. GUY DE CHAULIAC. Chirurgia. *Venezia*, BONETUS LOCATELLUS for OCTAVIANUS SCOTUS, 21 November, 1498. Folio.
Hain-Copinger 4811. Pellechet 3530, Proctor 5093.
95. GUY DE CHAULIAC. Chirurgia. *Venezia*, SIMON DE LOVERE, 23 December, 1499. Folio.
Hain-Copinger * 4812. Pellechet 3531. Proctor 5626.
96. GUY DE CHAULIAC. Chirurgia. [Lyon,] [VINCENTIUS DE PORTONARIUS, 1499.] Quarto.
Copinger 1546 = Peddie Conspectus: Lyon, 1499. Burger p. 544.
97. HALY ABBAS. Liber regalis. *Venezia*, BERNARDINUS RICIUS, 25 September, 1492. Folio.
Hain-Copinger * 8350. Proctor 4964. Burger p. 563.
98. HIPPOCRATES. De natura hominis. [Roma, GEORG HEROLT or STEPHEN PLANCK.] Quarto.
Hain-Copinger * 8669. Proctor 3943. Burger p. 434.
99. HORTUS SANITATIS. Ortus sanitatis. *Mainz*, JACOB MEYDENBACH, 23 June, 1491. Folio.
Hain-Copinger * 8944. British Museum Catalogue 44.
100. HORTUS SANITATIS. Ortus sanitatis. [Strassburg, JOHANN GRÜNINGER, b. 1497.] Folio.
Hain-Copinger * 8942.
101. HUGO [BENCIUS] SENENSIS. Super IV Fen primi canonis Avicennæ. *Venezia*, ANDREAS CALABRENSIS OF PAVIA, 4 February, 1485. Folio.
Hain-Copinger * 9018. Proctor 4965.
102. HUGO [BENCIUS] SENENSIS. Super I Fen primi canonis Avicennæ. *Ferrara*, ANDREAS BELFORTIS, 13 August, 1491. Folio.
Hain-Copinger 9016. Proctor 5751.
103. HUGO [BENCIUS] SENENSIS. Su-

- per aphorismos Hippocratis cum commento Galeni. *Ferrara*, LORENZO ROSSI with ANDREAS DE GRASSIS, 15 November, 1493. Folio.
Hain * 9011. Voulliéme Berlin 2873.
104. HUGO [BENCIUS] SENENSIS. *Consilia aurea*. *Pavia*, [LEONARDUS GERLA], 14 April. [1498.] Folio.
Reichling V, 1544.
Bound with another work of Hugo Bencius Senensis.
105. HUGO [BENCIUS] SENENSIS. *Super I Fen quarti canonis Avicennæ*. Addition: *De regimine sanitatis*. *Pavia*, [ANDREAS DE BOSCO.] *Pavia*, ANDREAS DE BOSCO, 29 October, 1498. Folio.
Reichling VI, 1766.
106. HUGO [BENCIUS] SENENSIS. *Super I & II Fen primi canonis Avicennæ*. Addition: *Super quarta fen primi Avicennæ cum annotationibus Jacobi de Partibus*. *Venezia*, BONETUS LOCATELLUS for OCTAVIANUS SCOTUS, 6 August, 1502. *Venezia*, BONETUS LOCATELLUS for OCTAVIANUS SCOTUS, [27 April,] 1498. Folio.
Hain-Copinger * 9017. Voulliéme Berlin 4204.
107. JACOBUS FORLIVIENSIS. *Expositio in Hippocratis aphorismos cum Marsilio di Sancta Sophia*. [b. 1480.] Folio.
Hain 7246. [diff.]
108. JACOBUS FORLIVIENSIS. *Expositio in Hippocratis aphorismos cum Marsilii de Sancta Sophia super aphorismos Hippocratis*. *Venezia*, BONETUS LOCATELLUS for OCTAVIANUS SCOTUS, 10 March, 20 May, 1495. Folio.
Hain-Copinger 7251. Voulliéme Berlin 4188. Copinger III, p. 261.
109. JOANNITIUS. *Isagogæ in tegni Galeni*. *Leipzig*, WOLFGANG [STÖCKEL] OF MÜNCHEN, 27 May, [14] 97. Quarto.
Hain-Copinger 9435.
110. JUNG, AMBROSIUS. *Tractatulus perutilis de pestilentia*. *Augsburg*, JOHANNES SCHÖNSPERGER, 20 November, 1494. Quarto.
Hain * 9472. British Museum Catalogue II, p. 368.
111. KAMINTUS. *Regimen contra pestilentiam*. [Antwerp, MATHIAS VAN DER GOES. c. 1484.] Quarto.
Campbell's Annales 1066. Copinger II, 3431.
112. KAMINTUS. *Regimen contra pestilentiam*. [Leipzig,] ARNOLDUS VON CÖLN, [a. 1493.] Quarto.
Hain * 9757. Proctor 3004. British Museum Catalogue III, 645.
113. KETHAM, JOHANNES DE. *Fasciculus medicinæ*. *Venezia*, JOANNES & GREGORIUS DE GREGORIIS, 15 October, 1495. Folio. Numerous illustrations.
Hain-Copinger * 9775. Proctor 4550. Choulant Abbildung p. 20.
114. KETHAM, JOHANNES DE. *Fasciculus medicinæ*. *Venezia*, JOANNES & GREGORIUS DE GREGORIIS, 17 February, 1500. Folio. Numerous illustrations.
Hain * 9777. Proctor 4561. Choulant Abbildung p. 22.
115. LANFRANCI. *Cirurgia menor*. *Sevilla*, Pro tres Alemanes compañeros, 15 May, 1495. Folio.
Reichling I, p. 162. Hæbler 349. Proctor 9523 A.
116. LAPIDARIUM. *Lapidarium medicinæ experimenta complectens*. *Wien*, JOHANN OF WINTERBURG, [c. 1495]. Quarto.
Copinger 3492.
117. LEONICENUS, NICOLAUS. *De Plinii et plurimorum aliorum in medicina erroribus*. *Ferrara*, LORENZO ROSSI with ANDREAS DE GRASSIS, 18 December, 1492. Quarto.
Hain-Copinger * 10021. Proctor 5760. Voulliéme Berlin 2872.
118. LEONICENUS, NICOLAUS. *De morbo gallico*. *Milano*, GUILIELMUS SINGERRE, 4 July, 1497. Quarto.
Reichling V, p. 172. Hain 10020. Copy I.
119. LEONICENUS, NICOLAUS. *De morbo gallico*. *Milano*, GUILIELMUS SINGERRE, 4 July, 1497. Quarto.
Reichling V, p. 172. Hain 10020.

- Copy II. With which are bound:
MONDINI. *Anatomia*, 1494. TRA-
NENSIS. De ingenuis moribus, 1496.
SAYONAROLA. Psalm L. [1498]
120. LEONICENUS, NICOLAUS. De morbo gallico. Venezia, ALDUS MANUTIUS, June, 1497. Quarto. Hain-Copinger * 10019. Proctor 5557. Voulliéme Berlin 4493.
121. LOCHER, JACOBUS. De partu monstroso carmen. Ingolstadt, [JOHANN KACHELOFEN, a. 26 November, 1499.] Quarto. Two woodcuts. Hain * 10162. Proctor 3165. British Museum Catalogue III, p. 679.
122. MACER FLORIDUS. De viribus herbarum. [Gêneve, LOUIS CRUSE, 1483-95.] Quarto. Last leaf missing.
123. MACER FLORIDUS. De viribus herbarum. [Paris, LE PETIT LAURENS, c. 1500.] Quarto. Hain-Copinger 10418. John Pierpont Morgan Catalogue 541. Imperfect.
124. MACER FLORIDUS. De viribus herbarum. [Paris, GUI MARCHAND.] Quarto. Numerous woodcuts. Hain * 10417. Voulliéme Köln p. 340.
125. MAGNINUS. Regimen sanitatis. Louvain, JOHANN OF WESTPHALIA, 1482. Quarto. Campbell's Annales * 1188. Proctor 9230. Burger p. 638. Hain-Copinger 10483.
126. MAGNINUS. Regimen sanitatis. Paris, UDALRICUS GERING, 5 March, 1483. Quarto. Hain * 10484. Proctor 7869.
127. MAGNINUS. Regimen sanitatis. Basel, NICOLAUS KESLER, [c. 8 November, 1493.] Quarto. Copinger II, 3756. Proctor 7701 A. Burger p. 450. Hain 10486. British Museum Catalogue III, 771. Variant I, 1^b is blank.
128. MAGNINUS. Regimen sanitatis. Basel, NICOLAUS KESLER. [c. 8 November, 1493.] Quarto. Copinger II, 3756. Proctor 7701 A. Burger p. 450. Hain 10486. British Museum Catalogue III, 771. Variant II, 1^b contains Letter.
129. MAGNINUS. Regimen sanitatis. Additions: REGINALDUS DE VILLANOVA. De phlebotomia. HIPPOCRATES. De astronomis: secreta. AVERROËS. De venenis. NICOLAUS SALERNITANUS: Quid pro quo. AVICENNA ET AL. [Lyon.] Quarto. Hain * 10482. Proctor 8705. Burger p. 486.
130. MAIMONIDES, MOSES. De regimine sanitatis. Firenze, SANCTUS JACOBUS DE RIPOLI. [c. 1478.] Quarto. Hain-Copinger * 10525. Proctor 6109. Burger p. 403.
131. MAIMONIDES, MOSES. Aphorismi medici. Addition: Johannis Damasceni aphorismi, Bologna, FRANCISCUS [PLATO] DE BENEDICTIS, 29 May, 1489. Quarto. Hain-Copinger * 10524. Proctor 6588. Voulliéme Berlin. 2750.
132. MANFREDI, GERONIMO. Liber de homine et de conservatione sanitatis. [Italian] Bologna, UGO RUGERIUS & DONINUS BERTOCHUS, 1 July, 1474. Folio. Reichling VI, p. 94. Copinger II, 2623. Proctor 6529. Hain 10689.
133. MANFREDI, GERONIMO. De peste. Bologna, [JOHANN VALBECK,] 31 December, 1479. Quarto. Reichling VI, 94. Hain * 10696.
134. MANLIIS, JOANNES JACOBUS DE. Luminare majus. Pavia, ANTONIUS DE CARCHANO, 9 April, 1494. Folio. Reichling III, p. 101. Proctor 7065. Hain 10711.
135. MANLIIS, JOANNES JACOBUS DE. Luminare majus. Venezia, BONETUS LOCATELLUS, 28 May, 1496. Folio. Hain-Copinger * 10712. Proctor 5070. Voulliéme Berlin 4192.
136. MATHEOLUS, PERUSINUS. De memoria augenda. [Roma, JOHANN BESICKEN & SIGISMUND MAYR.] Quarto. Hain-Copinger * 10906.

137. MESUE. Opera medicinalia. *Venezia*, CLEMENS PATAVINUS SACERDOS, 18 May, 1471. Folio.
cf. Hain-Copinger 11118. Proctor 4142.
138. MESUE. Opera medicinalia cum additionibus. *Venezia*, RENALDUS OF NIJMEGEN, 31 January, 1479. Folio.
Hain-Copinger * 11108. Proctor 4432.
139. MESUE. Opera medicinalis cum additionibus. *Venezia*, DIONYSIUS BERTOCHUS, 1484. Folio.
140. MESUE. Opera medicinalis cum additionibus. *Venezia*, PEREGRINO DE PASQUALE, 2 December, 1489, 21 November, 1490, 18 July, 1491. Folio.
Hain * 11110. Choulant, p. 354.
141. MESUE. Liber de consolatione medicinarum simplicium. *Venezia*, PETRUS DE QUARENGIS, 12 December, 1493. Folio.
Reichling VI, p. 97. Hain-Copinger 11116.
142. MESUE. Opera medicinalis additionibus. *Venezia*, BONETUS LOCATELUS for OCTAVIANUS SCOTUS, 31 March, 1495. Folio.
Hain * 11111. Proctor 5059.
143. METLINGER, BARTHOLOMÆUS. Regiment der jungen Kinder. [Augsburg, GÜNTHER ZAINER c. 7 December, 1473.] Folio.
Proctor 1537. Hain-Copinger 11127.
144. METLINGER, BARTHOLOMÆUS. Regiment der jungen Kinder. Augsburg, JOHANN BÄMLER, 28 August, 1474. Folio.
145. METLINGER, BARTHOLOMÆUS. Regiment der jungen Kinder. Addition: SCHRICK. *Ulm*, 1501. Augsburg, HANS SCHAUREN, 13 February, 1500. Quarto. Four illustrations.
Sudhoff 39.
146. MONDINI DEI LUZZI. Anatomia. [Leipzig, MARTIN LANDSBERG, c. 1493.] Quarto.
Hain-Copinger * 11633. Proctor 2994.
Voullième Berlin 1342.
147. MONTAGNANA, BARTHOLOMÆUS. Consilia medica cum additionibus. *Venezia*, BONETUS LOCATELUS for OCTAVIANUS SCOTUS, 2 August, 1497. Folio.
Hain-Copinger * 11552. Proctor 5081.
Voullième Berlin 4198.
148. MONTAGNANA, BARTHOLOMÆUS. [or by ZACHARIA DE FELTRE.] De urinarum judiciis. *Padova*, MATTHAEUS CERDONIS, 17 February, 1487. Quarto.
Reichling V, p. 198. Proctor 6821.
Hain-Copinger 11553.
149. MÜLLER, JOHANN [REGIOMONTANUS] Kalendarium. *Venezia*, ERHARD RATDOLT, 10 October, 1485. Quarto. Numerous diagrams.
Hain-Copinger * 13779. Proctor 4405.
150. NICANDER. Theriaca et alexipharmaca. *Venezia*, ALDUS MANUTIUS, July, 1499. Folio.
Hain-Copinger * 6257. Proctor 5571.
Voullième Berlin 4506.
151. NICOLAUS SALERNITANUS. Antidotarium. Quarto.
Reichling VI, p. 97. Proctor 4076.
Hain 11764.
Bound with this: ABULCASIS: Liber servitoris. *Venezia*, NICOLAS JENSEN, 1471.
Pellechet 411. Burger p. 444.
152. NICOLAUS SALERNITANUS. Antidotarium cum Mesue. [Strassburg, JOHANN PRÜSS, c. 1480.] Folio.
Hain * 11763. Voullième Berlin 2387.
153. ORTOLFF VON BAYERLAND. Arzneibuch. *Nürnberg*, ANTON KOBURGER, 17 March, 1477. Folio.
Hain * 12112. Proctor 1977. Voullième Berlin 1646.
154. ORTOLFF VON BAYERLAND. Arzneibuch. Augsburg, ANTON SORG, 11 August, 1479. Folio.
Hain * 12113.
155. ORTOLFF VON BAYERLAND. Frauenbüchlein. [Ulm, c. 1495.]
156. Pestilentia. Perutilis tractatus de pestilentia. [Augsburg, JOHANN KELLER, c. 1480.] Quarto.
Hain * 12745. Proctor 1746. British Museum Catalogue II, 361.

157. PETRARCA, FRANCESCO. *Epistolæ familiares. Venezia, JOANNES & GREGORIUS DE GREGORIIS, 13 September, 1492. Quarto.*
Hain-Copinger * 12811. Proctor 4526. Ashley 318.
158. PETRUS DE ABANO. *Conciliator differentiarum inter philosophos et medicos. Tractatus de venenis. Editor: PETRUS DE CARARIIS DE MONTE SILICE. De terminatione venenorum. Venezia, GABRIELE PETRI for D. THOMAS OF TREVISO [Corrector], 1476. Folio.*
Hain-Copinger * 2. Pellechet 2. Proctor 4196. Burger p. 532. Imperfect.
159. PETRUS DE ABANO. *Conciliator differentiarum inter philosophos et medicos. Tractatus de venenis. Editor: PETRUS DE CARARIIS DE MONTE SILICE. De terminatione venenorum. Venezia, GABRIELE PETRI for D. THOMAS OF TREVISO [Corrector], 1476. Folio.*
Hain-Copinger * 2. Pellechet 2. Proctor 4196. Burger p. 532.
160. PETRUS DE ABANO. *De venenis. Padova, [LEONARDUS (ACHATES) OF BASEL], 1473. Quarto.*
Pellechet 7. Hain-Copinger 8. Proctor 6775.
161. PETRUS DE ABANO. *De venenis. Roma, JOANNES PHILIPPUS DE LIGNAMINE, 27 January, 1475. Quarto.*
Pellechet 8. Hain 9.
162. PETRUS DE ABANO. *De venenis. Addition: ARNOLDUS DE VILLANOVA. De arte cognoscendi venena. VALESCO DE TARANTA. De epidemia et peste. [Padova], MATTHÆUS CERDONIS, 18 December, 1487. Quarto.*
Hain * 12. Pellechet 10. Proctor 6826. Burger p. 376.
163. PETRUS DE ABANO. *De venenis. Emendator: WILHELM HALDENHOFF. Leipzig, JACOB THANNER, 9 November, 1500. Quarto.*
Hain * 15. Burger p. 608.
164. PETRUS DE ABANO. *Conciliator differentiarum inter philosophos et medicos. Tractatus de venenis. Venezia, BONETUS LOCATELLUS for OCTAVIANUS SCOTUS, [15 March,] 1496. Folio. Woodcuts.*
Hain-Copinger * 4. Pellechet 4. Proctor 5069. Imperfect.
165. PETRUS DE ABANO. *Conciliator differentiarum inter philosophos et medicos. Venezia, JOHANN HERBORT, 9 February, 1483. Folio.*
Hain-Copinger * 6. Pellechet 5. Proctor 4689.
166. PETRUS DE ABANO. *Expositio problematum Aristotelis. [Venezia,] JOHANN HERBORT, 25 February, 1482. Folio.*
Hain-Copinger * 17. Pellechet 12. Proctor 4686. Burger p. 433.
167. PETRUS DE ARGELLATA. *Libri sex chirurgia. Venezia, [JOANNES & GREGORIUS DE GREGORIIS,] 12 September, 1499. Folio. Bound with Abulcasis.*
Copinger III, p. 241. Hain 1639.
168. PETRUS HISPANUS. *Practica medicinæ seu Thesaurus pauperum. [Firenze, BARTOLOMEO DE LIBRI, c. 1480.] Quarto.*
Reichling II, p. 191. Hain 8713 or 8714?
169. PETRUS HISPANUS. *Practica medicinæ seu Thesaurus pauperum. Antwerp, THIERRY MARTENS, 2 May, 1497. Folio.*
Campbell's Annales * 1395. Proctor 9453. Hain-Copinger 8712.
170. PEYLLIGK, JOHANNES. *Compendium philosophiæ naturalis. Leipzig, MELCHIOR LOTTER, 12 September, 1499. Folio. Woodcut illustrations.*
Hain-Copinger * 12861. Proctor 3036 A. Voullième Berlin 1393.
171. PISTOR, SIMON. *Declaratio defensiva positionis de mala franco. Leipzig, [CONRAD KACHELOFEN, a 3 January, 1500]. Quarto.*
Hain-Copinger * 13021. Proctor 2878. British Museum Catalogue III, 629.
172. PLATINA, BARTHOLOMÆUS. *De honesta voluptate. Venezia, LAUREN-*

- TIVS DE AQUILA & SIBYLLINUS UMBER, 13 June, 1475. Folio.
Hain * 13051. Proctor 4355. Voulliéme Berlin 3765.
173. PLINIUS SECUNDUS, CAIUS [THE ELDER]. *Historia naturalis*. With the corrections of PHILIPPUS BEROALDUS. Parma, STEPHANUS CORALLUS [OF LYON], 1476. Folio.
Hain-Copinger 13091. Proctor 6842. Voulliéme Berlin 3221. Collijn Stockholm 873.
174. *Prognosticon: Prognosticon de mutatione æris*. Addition: HIPPOCRATES: *Libellus de medicorum astrologia*. Translator: PETRUS DE ABANO. Venezia, ERHARD RATDOLT, 1485. Quarto. Redgrave 56. Reichling III, p. 160. Proctor 4401. Hain-Copinger 13393. Copy I.
175. PUFF, MICHAEL, OF SCHRICK. *Von den ausgebrannten Wassern*. Augsburg, JOHANN SCHONSPERGER, 1484. Folio.
Copinger III, 5320. Sudhoff 160 a.
176. *Quæstiones. Quæstiones naturales antiquorum philosophorum*. Cöln, CORNELIS DE ZIERIKKE, [1500]. Quarto. Copinger, III, 5004. Proctor 1500.
177. *Regimen Sanitatis. Regimen sanitatis salernitanum cum commentario* ARNOLDI DE VILLANOVA. Strassburg, [PRINTER OF JORDANUS OF QUEDLINGBURG], 29 December, 1491. Quarto. Hain-Copinger * 13758. Pellechet 1292. Proctor 666. Voulliéme Berlin 2446.
178. *Regimen Sanitatis. Regimen sanitatis salernitanum cum commentario* ARNOLDI DE VILLANOVA. Paris, FELIX BALLIGAULT, 17 November, 1493. Quarto. Pellechet 1296. Proctor 8246. Hain-Copinger 13760.
179. *Regimen Sanitatis. Regimen sanitatis salernitanum cum commentario* ARNOLDI DE VILLANOVA. Paris, ANDREAS BOCARD, 17 November, 1493. Quarto. Pellechet 1295. Copinger III, 5069.
180. *Regimen Sanitatis. Regimen sanitatis salernitanum cum commentario* ARNOLDI DE VILLANOVA. [Possibly French, c. 1485.] Quarto.
Hain-Copinger III, 5051. Proctor 7418.
181. *Regimen Sanitatis. Regimen sanitatis. Ulm*, CONRAD DINCKMUT, 5 October, 1482. Folio. Illustration.
Sudhoff 16. Hain 13742.
182. *Regimen Sanitatis. Regimen sanitatis salernitanum cum commentario* ARNOLDI DE VILLANOVA. [Louvain, JOHANN OF PADERBORN, a. 1480.] Quarto.
Pellechet 1279. Campbell's Annales 1469.
183. *Regimen Sanitatis. Regimen sanitatis. Augsburg*, HANS BÄMLER, 23 April, 1472. Folio.
Sudhoff 10. Hain * 13736. Incomplete.
184. *Regimen Sanitatis. Regimen sanitatis salernitanum cum commentario* ARNOLDI DE VILLANOVA. [Venezia, BERNARDINUS DE VITALIBUS, a. 1500.] Quarto. Woodcut.
Hain-Copinger 13750.
185. RHAZES. *Liber dictus Elhavi*. Brescia, JACOBUS BRITANNICUS, 18 October, 1486.
Hain-Copinger * 13901. Proctor 6984. Voulliéme Berlin 2823.
186. RHAZES. *Libri ad Almansorem*. Milano, LEONHARD PACHEL & ULRICH SCINZENZELER, 14 February, 1481. Folio.
Hain-Copinger 13891. Voulliéme Berlin 3087.
187. RHAZES. *Opera varia*. Addition: ARNOLDUS DE VILLANOVA. Practica. Venezia, BONETUS LOCATELLUS, 7 October, 1497. [Venezia], BONETUS LOCATELLUS, 7 October, 1497. Folio.
Hain-Copinger * 13893. Proctor 5082.
188. RHAZES. *Libri ad Almansorem cum additionibus*. Venezia, [BONETUS LOCATELLUS] for OCTAVIANUS SCOTUS, 10 April, 1490. Folio.
Hain * 13896. Proctor 5022. Choulant p. 344.
189. ROLANDO CAPELLUTI. *Tracta-*

- tus de curatione pestiferorum apostematum. [*Roma*, STEPHAN PLANNCK, a. 1480.] Quarto.
Hain * 4375. Pellechet 3228. Proctor * 3773.
190. ROLEVINCK, WERNER. Fasciculus temporum. [*Strassburg*, JOHANN PRÜSS, not before 1490.] Folio. Woodcuts.
Hain-Copinger * 6916.
191. SALICETO, GUILIELMUS DE. Chirurgia. 19 December, 1486. Quarto. Reichling III, 314.
192. SALICETO, GUILIELMUS DE. Summa conservationis et curationis cum chirurgia. Venezia, [JOANNES & GREGORIUS DE GREGORIIS,] 8 May, 1490. Folio.
Hain-Copinger 14145. Proctor 4515. Voulliéme Berlin 3862.
193. SALICETO, GUILIELMUS DE. De salute corporis. Addition: JOANNES DE TURRECREMATA. De salute animæ. [*Mantova*, PAULUS JOANNES DE BUTZBACH, c. 1480.] Quarto. Woodcut.
Hain-Copinger * 14150. Proctor 4014. A. Voulliéme Köln 540. Burger p. 365.
194. SALICETO, GUILIELMUS DE. Chirurgia. Lyon, MATTHIEU HUSZ, 16 November, 1492. Quarto.
Copinger III, 5212.
195. SALICETO, GUILIELMUS DE. Summa conservationis et curationis cum Chirurgia. Piacenza, 25 May, 1476. Folio.
Reichling, III, p. 169. Burger, p. 539. Hain 14144 [1475] † Hain 14146.
196. SALICETUS, NICOLAUS. Antidotarius animæ. Strassburg, JOHANN GRÜNINGER, 4 March, 1493. Quarto.
Hain-Copinger * 14161. Proctor 463.
197. SAVONAROLA, GIOVANNI MICHELE. Practica de ægritudinibus. Venezia, ANDREAS DE BONETIS, 10 May, 1486. Folio.
Hain-Copinger * 14481. Proctor 4819. Voulliéme Berlin 4036.
198. SAVONAROLA, GIOVANNI MICHELE. Practica de ægritudinibus. Venezia, BONETUS LOCATELLUS FOR OCTAVIANUS SCOTUS, 27 June, 1497. Folio.
Hain-Copinger * 14484. Proctor 5080. Voulliéme Berlin 4197.
199. SAVONAROLA, GIOVANNI MICHELE. Canonica de febribus et alii tractatus. Venezia, BONETUS LOCATELLUS for OCTAVIANUS SCOTUS, 22 November, 1498. Folio.
Hain-Copinger 14489. Proctor 5094. Voulliéme Berlin 4209.
200. SAVONAROLA, GIOVANNI MICHELE. De febribus, de balneis, de pulsibus, urinis, et egestionibus. Venezia, CHRISTOPHORUS DE PENSIS, 16 October, 1496-10, February, 1497. Folio.
Hain-Copinger * 14491. Proctor 5240. Voulliéme Berlin 4303.
201. SAVONAROLA, GIOVANNI MICHELE. De pulsibus, urinis, et egestionibus. Bologna, HENRICUS DE HARLEM & JOANNES WALBECK, 8 May, 1487. Folio.
Hain-Copinger * 14490. Proctor 6559.
202. SAVONAROLA, GIOVANNI MICHELE. Canonica de febribus. Venezia, CHRISTOPHORUS DE LENSIS, 16 October, 1496. Folio.
Hain-Copinger 14488. Proctor 5238. Voulliéme Berlin 4302.
Bound with 2 other works of Savonarola.
203. SAVONAROLA, GIOVANNI MICHELE. De balneis. Ferrara, ANDREAS DE BALFORTIS, 10 November, 1485. Folio.
Hain-Copinger * 14493. Proctor 5748. Voulliéme Berlin 2865.
204. SALICETO, GUILIELMUS DE. Summa conservationis et curationis cum chirurgia. Venezia, [JOHANNES & GREGORIUS DE GREGORIIS,] 8 May, 1490. Folio.
Hain-Copinger 14145. Proctor 4515. Voulliéme Berlin 3862.
205. SCHEDEL, HARTMANN. Liber chronicarum. Nürnberg, ANTON KOBBERGER, 12 July, 1493. Folio. Numerous woodcut illustrations.
Hain-Copinger * 14508. Proctor 2084. British Museum Catalogue II, p. 437.

206. SCHELLIG, CONRAD. Ein kurz Regiment der Pestilenz. [Speier, CONRAD HIST., 1502.] Quarto. Proctor 11605 A?
207. SCOTUS, MICHAEL. Liber physionomiæ et procreationis. [Venezia, JACOBUS DE FIVIZZANO,] 1477. Quarto. Hain-Copinger * 14550. Proctor 4364. Voullième Berlin 3766. Burger p. 398.
208. SCOTUS, MICHAEL. Liber physionomiæ et procreationis. [Treviso or Venezia? JOANNES RUBEUS, 1483.] Quarto. Hain-Copinger * 14546. Proctor 5128. [Venezia.] Burger p. 572.
209. SERAPION, "JUNIOR". Aggregator in medicinis simplicibus. Milano, ANTONIUS ZAROTUS, 4 August, 1473. Folio. Hain-Copinger * 14691. Proctor 5775. Voullième Berlin 3028.
210. SERAPION, "JUNIOR". Aggregator in medicinis simplicibus. Addition: SERAPION, "SENIOR". Brevarium medicinae. Venezia, RENALDUS OF NIJMEGEN, 1 August, 1479. Hain-Copinger * 14693. Proctor 4434. Folio. Venezia, RENALDUS OF NIJMEGEN, 1 June, 1479. Hain-Copinger * 14692. Proctor 4433.
211. SILVATICUS, MATTHEUS. Liber pandectarum medicinae. Venezia, PHILIPPUS PINZIUS for BERNARDINUS FONTANA, 16 June, 1492. Folio. Hain * 15021. Proctor 5292. Voullième Berlin 4343.
212. SILVATICUS, MATTHEUS. Liber pandectarum medicinae. Venezia, BERNARDINUS STAGNINUS, 27 March, 1499. Folio. Hain-Copinger * 15199. Proctor 4840. Voullième Berlin 4058.
213. SILVATICUS, MATTHÆUS. Liber pandectarum medicinae. [Strassburg, ADOLPH RUSCH, THE R PRINTER.] Folio. Hain-Copinger * 15192. Proctor 251. Voullième Berlin 2128.
214. SILVATICUS, MATTHEUS. Liber pandectarum medicinae. Venezia, JOHANN OF CÖLN & JOHANN MANTHEN, 10 October, 1480. Folio. Hain * 15198. Proctor 4347.
215. SIMON [A CORDO,] GENUENSIS. Clavis sanationis seu synonyma medicinae. Milano, ANTONIUS ZAROTUS, 3 August, 1473. Folio. Hain-Copinger 14747. Proctor 5774. Voullième Berlin 3027.
216. SIMON [A CORDO,] GENUENSIS. Clavis sanationis. Venezia, GUILLELMUS DE TRIDINO, 12 November, 1486. Folio. Maps. Hain-Copinger * 14749. Proctor 5109. Voullième Berlin 4217.
217. SOLDUS, JACOBUS. Opus de peste. Bologna, JOHANN SCHREIBER, 1478. Quarto. Hain-Copinger * 14870. Proctor 6548. Voullième Berlin 2736.
218. STEBER, BARTHOLOMÆUS. A mala franczos morbo gallorum præservatio ac cura. [Wien, JOHANN WINTERBURG, 1497-8.] Quarto. British Museum Catalogue III, p. 811. Proctor 9483. Voullième Berlin 2684. Hain-Copinger 15053.
219. STEINHÖWEL, HEINRICH. Krankheit der Pestilenz. Ulm, CONRAD DINCKMUT, [c. 1482]. Folio. Sudhoff 191. Hain 15057. Proctor 2560 A.
220. TORNEMIRE, JEAN DE. Clarificatorium super nono Almansoris cum textu Rhasis. Lyon, JOHANN TRECHSEL, 1490. Folio. Hain-Copinger * 15551. Proctor 8598.
221. TORRELLA, CASPAR. De dolore Addition: De ulceribus. Roma, JOHANN BESICKEN with MARTIN OF AMSTERDAM, 31 October, 1500. Quarto. Proctor 4000. Hain-Copinger 15559. Voullième Berlin 3547.
222. TORRELLA, GERÓNIMO. De imaginibus astrologicis. Valencia, ALFONSO DE ORTO, [a. 1 December, 1496.] Quarto. Proctor 9507. Hain-Copinger 15560.
223. TUSSIGNANA, PIETRO DE. Tractatus de peste. Quarto. Compare Hain-Copinger * 15750 [diff.]

224. VALASCUS DE TARANTA. De epidemia et peste. [Basel, MARTIN FLACH c. 1470]. Folio.
Hain-Copinger 15244. Proctor 7552. Voulliéme Berlin 424.
225. VALASCUS DE TARANTA. Practica seu philonium. NICOLAUS WOLFF, 10 March, 1500. Quarto.
Hain-Copinger * 15252. [diff.] Gunther Leipzig. 1715.
226. VALASCUS DE TARANTA. De epidemia et peste. Hagenau, HEINRICH GRAN, 23 November, 1497. Quarto.
Hain * 15247. Proctor 3190. Voulliéme Berlin 1178. British Museum Catalogue III, p. 685.
227. VALLA, GIORGIO. Interpretationes variæ. Venezia, SIMON BEVILAQUA, 30 September, 1498. Folio.
Hain-Copinger 11748. Proctor 5408. Voulliéme Berlin 4410.
228. VERSEHUNG. Versehung, Leib, Seel, Ehr und Gut. Nurnberg, [PETER WAGNER, 14] 89. Quarto. Woodcut.
Sudhoff 230. Hain-Copinger * 16019. Proctor 2244. Voulliéme Berlin 1873. British Museum Catalogue II, p. 463.
229. WIDMANN, JOHANN. Tractatus de pustulis quæ dicuntur Mal de Franzos. [Strassburg, JOHANN [REINHARD] GRÜNINGER, a. 1 February, 1497.] Quarto.
Copinger III, 6573. Proctor 478. Voulliéme Berlin 2332. Hain-Copinger 16160.
230. ZERBI, GABRIELE. De cautelis medicorum. [Venezia, CHRISTOPHORUS DE PENSIS, n. b. 1495.] Quarto.
Hain-Copinger * 16286. Proctor 5235.
231. ZERBI, GABRIELE. Gerontocomia. Roma, EUCHARIUS SILBER, 27 November 1489. Quarto.
Reichling VI, p. 181. Proctor 3840. Voulliéme Berlin 3486. Hain 16284.



If our young medical student would take our advice, and for an hour or two twice a week take up a volume of Shakespeare, Cervantes, Milton, Dryden, Pope, Cowper, Montaigne, Addison, Defoe, Goldsmith, Fielding, Scott, Charles Lamb, Macaulay, Jeffrey, Sydney Smith, Helps, Thackeray, etc., not to mention authors on deeper and more sacred subjects—they would have happier and healthier minds, and make none the worse doctors. If they, by good fortune—for the tide has set in

strong against the literæ humaniores—have come off with some Greek or Latin, we would supplicate for an ode of Horace, a couple of pages of Cicero or Pliny once a month, and a page of Xenophon. French and German should be mastered either before or during the first years of study. They will never afterwards be acquired so easily or so thoroughly, and the want of them may be bitterly felt when too late.

Horæ Subsecivæ, by John Brown.



NOTES AND QUERIES

[In the initial volume of the *Index Medicus* (1879) a department of "Notes and Queries," relating to medical history and medical bibliography, was established by Dr. Billings, Dr. Fletcher, Thomas Windsor and others, but from lack of interest in the readers of the journal, due no doubt to the backward state of medico-historical investigation in this country at that time, the project did not take hold and was soon abandoned. In a journal devoted exclusively to medical history it seems fitting and proper that items of this kind should be introduced from time to time, with the proviso that both questions and answers be brief and to the point. Those subjoined are believed to be difficult of solution.—*Editor*.]

1. PURPOSEFUL DEFORMATION OF CHILDREN (*CHIRURGIE AU REBOURS*).—In Victor Hugo's "*L'homme qui rit*" (I, 2; III, 6), considerable space is devoted to an affiliation of seventeenth century criminals (*los comprachicos*) who bought and sold friendless or abandoned children for the purpose of maiming or disfiguring them by reversed orthopedic procedure (*chirurgie au rebours*), in order to turn their deformities to profit. Hugo mentions a certain Dr. Conquest as the author of a Latin treatise on this variety of "reversed orthopedics," and from an alleged chapter, "*De denasatis*," he gives the citation "*Bucca fissa usque ad aures, genzivis denudatis, nasoque murdridato, masca eris, et ridebis semper*" as the recipe employed in the disfigurement of the unfortunate Gwynplaine. Did Conquest really exist, and if so, what was the title of his treatise? When and where was it published? Or were these chapters in "*L'homme qui rit*" mere romancing and literary *supercherie*?

2. MATHILDE MARCARD AND WERLHOF'S WEDDING.—In H. Rohlf's biographical sketch of Werlhof, it is stated that Mathilde Marcard wrote, from reports of eye witnesses and personal letters, an interesting account of the ceremonies of Werlhof's second marriage, which is described as of considerable cultural value. Some pleasant details of this account have been reproduced by Rohlf and are again given, in condensed

form, in Baas's "History of Medicine." Was the original writing of Mathilde Marcard ever published, and, if so, where, when and by whom?

3. LIFE OF ALOIS BEDNAŘ.—Nothing is known of the life of the Viennese pediatrician, Alois Bednař, beyond the few lines given by Gurlt, in Hirsch's "*Biographisches Lexicon*" (VI, 470), which merely states that Bednař was a Privatdocent at the University of Vienna, giving a list of his three treatises on diseases of infancy (1850-53), pediatrics (1856) and dietetics of infancy (1857). Can the dates of his birth and death, with any other biographical data (with sources) be supplied?

4. LIFE OF FREDERICK CORBYN.—Frederick Corbyn, a surgeon in the Indian Medical Service of Great Britain, was editor of the *India Journal of Medical and Physical Science* (Calcutta, n.s., v. 1-7, 1836-42), usually known as *Corbyn's Journal*, which was started by John Grant and J. T. Pearson as the *India Journal of Medical Science* (Calcutta, 1834-5), and is remarkable for its outline portraits of prominent medical officers of the Indian Medical Service. Corbyn was also the author of the "Management and Diseases of Infants under the Influence of the Climate of India" (Calcutta, 1828), which is the earliest treatise on tropical pediatrics, and also of "A Treatise on Epidemic Cholera as It Has Prevailed in

India" (Calcutta, 1832). No details of Corbyn's life are given in Lieut. Colonel D. G. Crawford's "History of the Indian Medical Service" (London, 1914) or elsewhere. Can the dates of birth and death be supplied, with sources?

5. JOHN BELL.—Is any portrait of the artist surgeon John Bell [1763-1820], of Edinburgh, extant, and if so, where can it be obtained?

6. EMIL NOEGGERATH [1847-95].—Beyond a brief memorial note in Virchow's *Archiv* (1896, CXLIII, 680), and the personalia in Dr. Arpad G. Gerster's "Recollections" (New York, 1917, 200), no biographical data exist about the late Emil Noeggerath, a gynecologist who introduced the theory of latent gonorrhea and the operation of epicystotomy, and was associated with Jacobi in "Contributions to Midwifery, and Diseases of Women and Children" (1859) and in the editorship of the *American Journal of Obstetrics* (1868-71). Can any other facts be supplied, from personal knowledge or otherwise? F. H. G.

7. SURGICAL INSTRUMENTS.—Satisfactory illustrations of early surgical instruments of the time of the ancient Greeks and Romans are at the present time difficult to find.

The standard work of Overbeck on the excavations at Pompeii contains the same old wood-cuts published over thirty years ago. The reproductions, in atlas, of these instruments by Vulpes are almost inaccessible, in the city of New York, at least. The illustrations used by Védrenes in his translation of Celsus are very clear, but they are almost too perfect drawings to be correct reproductions. The latest and most complete book on this subject was by the late Dr. Milne of England. In the back of his book are a series of half-tone reproductions of instruments from various Museums of Europe. The half-tones, however, are extremely poor and do not give a good idea of the character of the instruments. The general impression is that the surgical instruments of ancient days have only been found at Pompeii and Herculaneum. As a matter of fact, collections have been made from many other sources, Baden, Cologne, Paris, for example. Perhaps some reader can tell us whether there are any better illustrations than are mentioned here, and especially whether there are any collections in this country. In France Dr. Hamonic, of Paris, had a good collection, and so I am informed, had Dr. Milne.





EDITORIALS

DR. STEPHEN SMITH, THE NESTOR OF AMERICAN SURGERY

THE publication of Dr. Smith's charming "History of Surgery," in the concluding volume of Stedman's "Reference Handbook" (viii, 28-57), reminds us of the debt of gratitude which the American profession owes to this remarkable man whose public activities have extended over half a century and, apart from his own specialty, have included the broadest and most beneficent kinds of social service, from hospital construction and the improvement of homes of the laboring and tenement house population of New York City to the sane and humane treatment of the insane and the advancement of public hygiene in his own state.

On February 19, 1918, Dr. Smith attained the ripe age of ninety-five. On May 6 following, Dr. Jacobi will be eighty-eight. One is the Nestor of American surgery, the oldest living representative of the surgical profession in the United States; the other is the father and founder of American pediatrics, and by the same token, the Nestor of our internists. For what is pediatrics but internal medicine applied to children? Both are still youngish men, outstanding examples of *la jeunesse de la vieillesse*, that is, of those whose future is "before them, not behind them." Both are still able, vigorous thinkers; both have been upstanding champions of the right, outspoken in

criticism of the evils and deficiencies of medicine and hygiene in their time; both are universally beloved and respected. The only difference is that one is seven years older than the other.

Dr. Stephen Smith was born in Onondaga County, New York, on February 19, 1823, and is a descendant of Job Smith, an officer of the Fifth Regiment of the Connecticut line in the War of the Revolution. Brought up on his father's farm in the central part of the state, his own native industry soon carried him beyond the slender attainments possible in common schooling, and when, at the age of twenty, he was able to attend the Cortland Academy (Homer, New York), he had already taught himself Latin, Greek and the ordinary branches of the higher mathematics. Dr. Smith's brother was the celebrated Dr. J. Lewis Smith, a physician whose fame, as Billings said of Daniel Drake, "will probably be greater a hundred years hence than it is now." Although he disliked and resented the appellation of "specialist," J. Lewis Smith and Jacobi were the first in this country to teach and practice pediatrics as a distinct and separate branch of internal medicine. Wonderful to relate, when we consider the period, Dr. Smith's well-known textbook, which was based mainly upon his own clinical and post-mortem experience, passed through no less than eight editions (1869-96). Dr. Lewis Smith was a man who was so intrinsically good, so unworldly and unselfish,

that, in our time—the age of the struggle-for-lifer, the *arriviste* and the *parvenu*—he would need a guardian. Externally he was only the plain, unassuming family doctor of the old-fashioned American type; but in the history of medicine he has a place with men like Charles West and Jacobi as one of the forerunners of humanistic pediatrics, the practice of internal medicine among children, not as a cold, lifeless business or laboratory “specialty,” but from a peculiar affection for the children themselves. When we have named these three, we can think of but few others in the same class: Chapin, notably, among the living, and Théophile Roussel, among the dead.

The two brothers Smith attended Cortland Academy together and studied medicine together. Their first preceptor was Dr. Caleb Green, of Homer, New York, formerly Professor of *Materia Medica* at the Geneva Medical College, at which institution Stephen Smith took his first course of lectures, under such masters as Frank Hamilton and Austin Flint. Entering Hamilton's office, at Buffalo, New York, he attended his second course of lectures at the Buffalo Medical College, and, in 1849, became interne or resident pupil in the Buffalo Hospital of the Sisters of Charity, where he had considerable experience with cholera, which was then epidemic. In the autumn of 1849 he entered upon his third course at the College of Physicians and Surgeons, New York City, from which he was graduated in the spring of 1850, and, as an earlier sketch of him relates, “found himself in a strange city, with legalized power to practice, and nobody to treat.” There happened, providentially, to be a vacancy in the resident staff of Bellevue Hospital at the time. Dr. Smith was one of twelve applicants for the place. He passed the rigid examination of the Board successfully and at once entered upon his duties.

In this period, the leading figure at

Bellevue was the celebrated Alonzo Clark, whose name is historically associated with the therapeutic “wrinkle” of exhibiting large doses of opium in puerperal peritonitis (1855) and with several witty epigrams. One of these completely reverses and obliterates the poesy of the French byword: *Si jeunesse savait, si vieillesse pouvait*. As a student, Clark wished to marry a daughter of a wealthy man but was rejected by her parent on the ground that there was not enough money. When Clark became a celebrity, the proposition of marriage was revived by the parent himself. “Alonzo Clark, the student, couldn't; Alonzo Clark, the professor, wouldn't,” was the somewhat metallic reply. During his incumbency at Bellevue, Dr. Smith had charge of the lying-in wards, and was requested by Clark to put the opium treatment to the test in the cases of puerperal peritonitis, then so frequent. Clark's requirement was no less than saturation of the system with opium to the point of semi-narcotism, but young Smith was cautious and, at first, got no results from his administration of the drug. Clark then took him aside, and the following conversation ensued:

“Dr. Smith, have you ever attended a common school?”

“Yes, sir.”

“Did you ever have a teacher say to you, ‘I will whip you within an inch of your life?’”

“Yes sir, I have, and I have also had it applied to myself.”

“Well, that is the way I wish you to give opium to these patients—let it be to ‘within an inch of their lives!’”

This heroic treatment was then carried out upon four patients, under two reliable nurses, Dr. Smith visiting each patient every hour, night and day. One patient yielded to treatment under two grains of opium hourly; the second nearly succumbed under three grains; the third re-

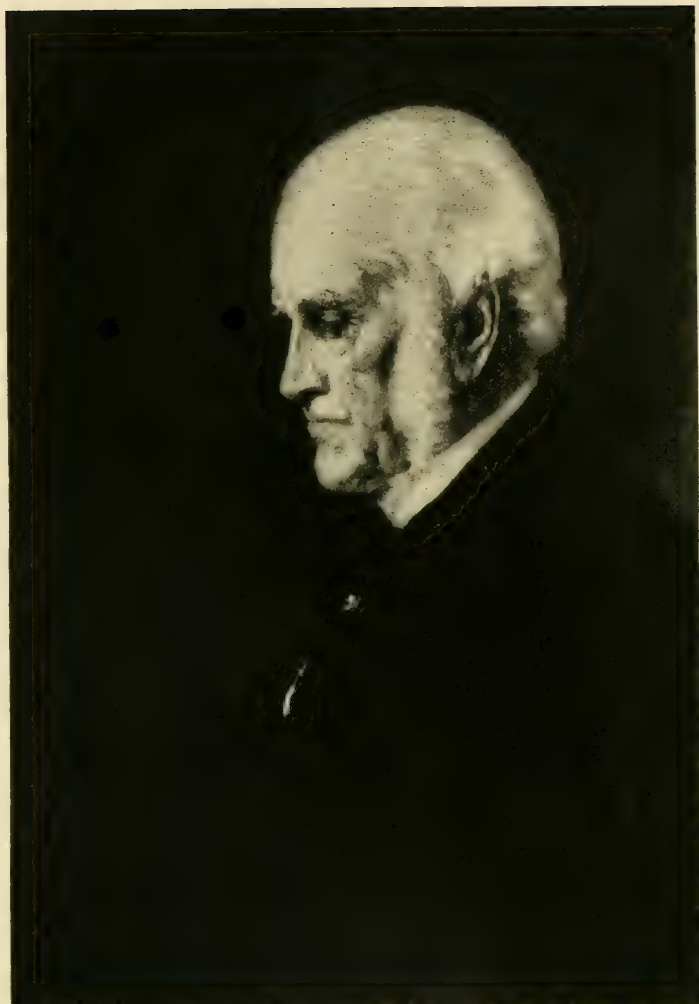
quired four grains; and in the fourth the gigantic tolerance of the human system for opium was such that $4\frac{1}{2}$ grains hourly were required to produce a semi-comatose condition, and no less than 1,900 grains were taken, without vomiting or purging, before the course of treatment was completed. Yet all the patients recovered, and through such experiences this therapeutic device acquired a certain vogue in gynecology, by reason of the diminution of the mortality rate in puerperal peritonitis. In his early period at Bellevue, Dr. Smith was consulted in a medico-legal case of rupture of the bladder, from external violence, the possibility of which had been doubted in the court room evidence on account of the rarity of the condition. He was able to collate and tabulate some 78 cases from the literature—a remarkable piece of painstaking work, in the days when medical bibliographies, in Billings' sense, were non-existent. This, his first important paper, was published in May, 1851.¹ Later, it was translated into German and French, which led to his being made a member of the Surgical Society of Paris.

On leaving Bellevue Hospital Dr. Smith commenced practice in New York City where, through his contributions to the *New York Journal of Medicine*, he came in contact with its editor, Dr. Samuel S. Purple, who was one of the earliest physicians to follow medical history and to collect rare medical books in this country, and whose choice collection is now in the Library of the New York Academy of Medicine. In 1853, Dr. Smith became joint proprietor and co-editor of the Journal, and, in 1857, after the retirement of Doctors Purple and Bulkeley, he assumed full editorship. In 1860, the *New York Journal of Medicine* became the *American Medical Times*, which Dr. Smith continued to edit until 1864.

In 1854, Dr. Smith was elected one of the attending surgeons at Bellevue, where

¹ *New York J. M.*, 1851, vi, 336-375.

he made a reputation by his ability, his unfailing self-possession, his humane efforts in behalf of the patients, and his power of concise expression in lecturing. These were the early post-anæsthetic days, when painless surgery had not yet become firmly established, and when patients, writhing with pain, were sometimes lectured over. Although he frequently taught major surgery at the operating table, Dr. Smith would never lecture during an operation, but only before or after removal of the patient. Among his earlier surgical feats were a ligation of the common iliac artery and the first Syme amputation at the ankle joint in this country after Carnochan's case. At the beginning of the Civil War, a number of books on military medicine, surgery and hygiene were published by S. D. Gross, Roberts Bartholow, William A. Hammond, J. J. Woodward and other well-known American physicians. This characteristic tendency goes back to the American Revolution (John Jones, Benjamin Rush, William Brown), and, judging by the large crop of medico-military manuals on hand, is now in evidence in all the warring countries. In 1862, at the suggestion of professional friends who had entered the medical staff of the Volunteer Army, Dr. Smith published a "Hand-book of Surgical Operations," designed as a pocket manual, for use in the field. Of the large group of such books above mentioned, this was the only one which survived a first edition. The fifth edition of Dr. Smith's Hand-book was published in 1863, a triumph for that darling of the medical publisher and his clientèle, the small-sized book. The reasons for its success were not only its size, shape and flexible covers, but its well-arranged, exhaustive index, its useful illustrations, the large amount of information compressed into its 274 pages, and its eminently practical tendency. It plunges, at the opening of Chapter I, without preliminaries, into the make-up of a surgeon's pocketcase,



Stephen Smith

the proper way to make incisions with scalpel and bistoury, and the suturing and dressing of wounds. In this connection, we are reminded of the fact that the most successful and useful medico-military textbooks published at the present hour have been written in the same concise, precise manner. The sentiment of the officer in the field would seem to be: "Long life to the small-sized book!" Proximity at the battle-front is unthinkable.

During 1861-1865 Dr. Smith was Professor of Surgery in Bellevue Hospital Medical College, after which he held the chair of anatomy until 1874, in which year he became Professor of Clinical Surgery in the Medical Department of New York University. In 1865, he made an investigation of the sanitary condition of New York and reported his findings to the legislature. In 1866, he made a report on hospital construction to the trustees of Bellevue Hospital, and was one of the five physicians who submitted plans for the construction of the Johns Hopkins Hospital (1875), the award in this competition being made to the late Dr. John S. Billings. His papers on the improvement of the homes of the tenement house population in New York City were published in 1873-1875. In 1882, Dr. Smith was appointed State Commissioner in Lunacy of New York by Governor Alonzo B. Cornell, and during his incumbency (1882-1888) the following reforms were effected: (1) the introduction of a training school for attendants, (2) the creation of a State Commission in Lunacy, (3) the removal of the insane from county to state care—in other words, a steady improvement over the old conditions, in which the insane were pauperized "in filthy cells and stalls, shackled hands and feet, and fed like swine," up to the "kindly care, good food, clean sanitary dormitories and freedom from cruel forms of restraint" of the now unrivalled State hospitals of New York. Dr. Smith's experiences are sum-

marized in his book "Who Is Insane?" (1916), which is a large-minded consideration of "the illusive nature of insanity, its origin in the derangement of the functions of the brain-cells, the extreme impressibility of these cells and our power to increase or repress their activities," a series of piquant homilies on the Horatian "*naviget Anticyram*." The book is highly practical, and leaves one with the humorous impression that the whole world is potentially or (as in present Eastern Europe) actually mad. "A mad world, my masters." We may take comfort in the observation, quoted by Osler: "Every man has a sane spot somewhere." As to "the failure of the alienists to formulate an acceptable definition of insanity for the profession and the courts," Dr. Smith is at one with Shakespeare:

To define true madness,

What is it but to be nothing else but mad?

Among Dr. Smith's other public activities have been his services as member of the city and national Boards of Health, and the State Board of Charities, his work with the United States Sanitary Commission, and his Commissionership to the Ninth International Sanitary Convention at Paris (1894). He was one of the founders and also first president of the American Public Health Association (1873), has published many contributions to public hygiene, and has done much for the improvement of the Department of Health of New York City.

To the literature of surgery, Dr. Smith has contributed many papers, notably his analysis of 439 recovered amputations in the continuity of the lower extremity, one of the surgical memoirs of the United States Sanitary Commission (1871). In 1879, he published a "Manual of the Principles and Practice of Operative Surgery," a large treatise of 689 pages, which was re-issued, enlarged and revised in 1887. To the history of surgery, he has made two important

contributions, viz., his monographs on "The Evolution of American Surgery" published in Bryant and Buck's "American Practice of Surgery" (1906), and "The History of Surgery" in Stedman's "Reference Handbook" (1917). These are both able and vigorous contributions, worthy of a place beside the writings of Gross, Billings, Pilcher, Dennis and other Americans who have worked in this field.

Personally, Dr. Smith is a valiant, up-standing character, straight, erect, and self-disciplined as an army officer, keen and quick of perception, yet with the genial, humorous "twinkle." No one could clasp his hand and look into his face without feeling impressed with his astonishing vitality and virility. Those of us who heard his vivacious address to the medical students at Syracuse, in 1915, were treated to a captivating volley-fire of humorous recollections and anecdotes which carried the younger men quite away. As we listened, with shaking sides, some of us could but re-echo the sentiment expressed by Professor Thayer at a banquet given to another distinguished physician:

Long may he live to taste alike
Of age and youth the joys;
Old, yes, in years, but in his heart,
A boy among the boys.

F. H. G.

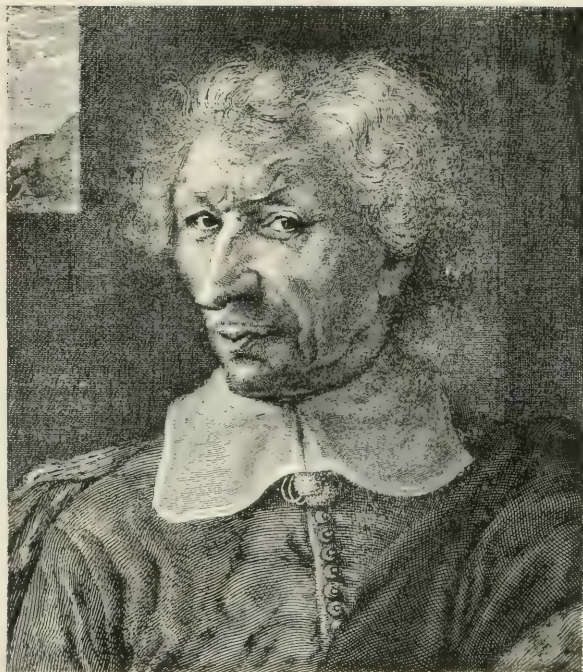
It has been especially through the industry, zeal and historical activities of Dr. D. Bryson Delevan that New York City has been shown to have unusual importance in the history of the development of laryngology.

According to Dr. Delevan, it was in New York that attention was first especially called to the diseases of the throat by the establishment of special public clinics and of professorships in this branch of medicine. It was here that the possibility of topical

treatment of the larynx was first shown, and here that intralaryngeal surgery had its birth. The art of photographing the larynx was perfected by a Brooklyn laryngologist. The causes of nasal obstructions were discovered and the methods of relieving them devised by New York surgeons. There followed from this definite knowledge concerning sinus diseases. Intubation was made a practical measure here. Graduate courses in laryngology and rhinology were established in New York, and the first society of laryngologists that was ever organized was established here. Dr. Delevan has done much to infuse a civic pride in New Yorkers over the work done in laryngology in this city.

CHARLES L. DANA.

The history of medicine furnishes a subject which can be approached from several points of view, and it is one that may be treated in various ways, excellent or distressing. No doubt the best one is that of scientific research, by means, for example, of a study of original documents. Through this we secure new data and gain new interpretations. This kind of work is essential to progress. It is the laboratory method, and justly acclaimed by the chosen few, who are in the position to follow it. Medical history may also be approached by the descriptive and literary method, and it is through this method that historical matter is made vital and brought into touch with current life, contributing to education, recreation and art. The descriptive historiographer must have not only literary skill, but a sense of the proportion of things; he must have some learning and do some research also. As this kind of writing is open to any one trained or untrained, it may be done and often is done stupidly and verbosely, with little result of real importance to the world. Medical history and epidemiology may also be studied for their



*Al' Guido Latin doctor medicus parisiensis
medicus et professor Regius*

use in contributing toward the larger problems of general history and of human progress, being drawn upon as an ancillary to more serious and important work. This has been done in efforts to explain the extinction of the Grecian States, and the decline of the imperial power of Rome.

Medical history is drawn upon to illustrate social customs, criminology, extraordinary human characters, and causes, and the stupidities of legislation. There is an interesting form of medical history which is strictly biographical, and this is by no means the least important of the methods of historical work.

There is thus a long list of phases and types of medico-historical writing, and an application of data obtained throws light upon a number of present-day human problems. It is wise to encourage all kinds of historical writing and to censure only that work which is insincere, careless and, perhaps, that which attempts to be funny. The gods forgive everything but dullness; those who are interested in medical history must sometimes forgive even this. Let those who would avoid this, study the contributions of Sir William Osler.

CHARLES L. DANA

Guy Patin (1601-1672), Dean of the Faculty of Medicine of the University of Paris, Professor of Surgery and, later, of Medicine, was an important person in the medical life of Paris in the seventeenth century. Although he contributed nothing to medical science, he made a place for himself in medical history and, to an extent, in the world of letters, through the force of his personality and his gifts of erudition, eloquence and satirical wit.

Patin was a reactionary, a follower of Hippocrates and Galen, a hater of the chemical school, and was defiant of the value of the antimony which was then becoming a substitute for bleeding. He did not believe

in innovations or that any improvement could be made in the science and art of medicine as laid down by Galen.

He was learned in the classics and in literature; he had a ready and prodigious memory. He was an eloquent and witty speaker, and his lectures were so popular that the laity crowded into his amphitheater to hear him.

He became one of the most popular and successful physicians of his day, and was invited by the Queen of Sweden to be physician at her court, and by the Senate of Venice to establish himself in that city. He was a bit litigious: he had a serious lawsuit against the famous Renardot, who tried to start a commercial dispensary, and he was sued by the apothecaries because he publicly attacked their popular mixtures. He was one of the first to denounce publicly the secret and proprietary medicine business, and he won out in his fight.

Patin believed in bleeding, senna and ptisanes, and he denounced the chemical remedies and polypharmacy with its mithridates and theriacs and benzoar compounds. He was even a little doubtful of quinine, and was cautious in the use of opium and alcohol.

He wrote a little book on the preservation of health, and always maintained it was easier to keep well than to get well. Were he living now he would have been a zealous sanitarian.

He had a large acquaintance and wrote many letters, and he called himself of the "literary group." In those days stone in the bladder was considered the penalty of being learned. Patin thought the best preventative was *vini privatio*, but to make additionally sure he gave himself "*cinq ou six bonnes saignées de precaution par an*."

After his death, his letters were published; they were eagerly read, and went through several editions. They told the gossip of the town, and threw interesting side lights on life in Paris in the seventeenth century.

Few medical men of that century have been more written about or had their lives and characters more frequently commented upon.

A very considerable literature has grown up around Guy Patin and his family, for he had an unusually talented wife, and he had two sons who became physicians. One of them, Charles, became a professor at the University of Padua and gained a very considerable distinction in medicine and numismatics. The *bons mots* of Patin were published in a book, entitled "Patiniana."

Many editions of his letters were published, and comments on his life and career have appeared by various authors. Dr. Pierre Pic published a work on the career and character of Patin, Paris, 1911. Dr. Felix Larrieu published a monograph on "Patin, His Life, His Work and His Therapeutics," in 1889, and a very elaborate work was published in 1898, by L. Vuilhorgue.

The comments on the career and character of Patin have not always been by any means commendatory. But whatever one

feels with regard to the qualities of his character and the work that he did—and he was fiercely honest, genuinely learned, brilliant in lecture and conversation, true in his many friendships and devoted to his family—one cannot help feeling kindly towards the man who said:

"J'aime bien les enfants; j'en ai six et il me semble que je n'en ai point encore assez. Je suis bien aise qu'ayez une petite fille. Nous n'en avons qu'une, laquelle est si gentille et agréable que nous l'aimons presque autant que nos cinq garçons."

CHARLES L. DANA.

The publication of this, the third number of the ANNALS OF MEDICAL HISTORY, has been greatly delayed owing to the fact that the editor has been called into service and to the fact that all the gentlemen connected with the editorial work have been very much occupied by duties in connection with the war. The material for the fourth number is now in hand and it will appear with very much less delay.





BOOK REVIEWS

EARLY HISTORY OF NORTH CAROLINA MEDICAL SOCIETY. By Dr. Wesley Long, M.D., Greensboro, N. C. A reprint of an address delivered at the sixty-fourth annual meeting of the North Carolina Medical Society.

The author has spent two years of hard work in obtaining the data regarding the organization about which he writes and he has succeeded in bringing to light many interesting facts about the pioneer work of the North Carolina Medical Society.

It seems that North Carolina was one of the first states to have a medical society. Such a society was organized in 1799, and met yearly for five successive years, when it dropped out of existence, and there was then no state organization until the present society came into existence in 1849. The first society was evidently composed of men of intelligence and vision. They recommended the establishment of a board of medical examiners, and the dividing of the state into districts, with meetings in these various districts.

Dr. Charles Smith was perhaps the first American physician on record who was subjected to examination by a board of examiners. Dr. Long suggests that he ought to have a monument.

The Proceedings of the early North Carolina Society show that they were a serious as well as an intelligent set of men, and the local paper states that at the meeting in 1801, a "considerable number of respectable physicians" were present. The presidential address contained "a cursory narrative of the progress of the science of medicine from the earliest ages," showing that the gentlemen of those days took an interest in the history of medicine. They also

appointed a committee to found a botanical garden and a medical library.

All together, from the scanty records of this pioneer organization, we feel sorry that it did not go on.

The present North Carolina Medical Society dates from 1849. Dr. Long gives a brief summary of the work of these meetings, year by year, up to 1861, and he adds biographical notes of the presidents and important officers during that time. He made a careful search for the portraits of the officers of the Society in the early days. Dr. Long is a resourceful man, and when he could not get a picture of an ancient father he put in a picture of his grave. The oldest portrait is that of Dr. James Webb, who was a censor in 1801 and a very handsome man.

The pictures of other men who are incorporated in this monograph show them to be persons of intelligence and force. Undoubtedly it required those qualities to be a successful physician in pioneer days.

Dr. Long has made an original and very interesting contribution to American medical biography.

CHARLES L. DANA

THE NURSE IN GREEK LIFE. By Sister Mary Rosaria, M.A., of the Sisters of Charity, Halifax, N. S. A dissertation submitted to the Catholic Sisters College of the Catholic University of America in partial fulfillment of the requirements for the degree, Doctor of Philosophy. 51 pp., 1.1., 8°. Boston, June, 1917.

This is a beautiful piece of synthetic work. What purports to be a dissertation in classified philology is, for the physician at least, a most fascinating study of the cultural history of Greek pediatrics.

On the textual side, admirable analyses of the Hippocratic and post-Hippocratic pediatrics have been made by Kroner, Troitzky and others, but this is the first extensive handling of the present theme. Hitherto, the subject has only been adumbrated in such things as the section on "Kinderpflege," in Sudhoff's Catalogue of the Dresden Hygienic Exhibit (1911, pp. 138-144) or the charming pages in J. P. Mahaffy's "Social Life in Greece from Homer to Menander" (London, 1913, 29-31, 163-168). Sister Mary Rosaria builds up the whole cultural scheme of Hellenistic pediatrics from citations from the poets, dramatists, orators, philosophers and physicians of classical antiquity.

Beginning with a short introductory chapter on the Greek terms used for "nurse" (*τροφός*, *τιθήνη* *μαῖα*, and *τίτθη*), the successive sections deal with the social status of the nurse, the nurse and the family, including bathing, swaddling, wet-nursing, cradling, fondling, humoring and all other phases of "mothering" the infant, also toys and games, nursery tales and lullabies, closing with a chapter on monuments to the nurse, and a bibliography of sources. The high esteem in which the nurse was held in ancient Hellas, even when her tender charges had grown up to be men and women, is plain. As in Elizabethan England, and even later in Scotland, the nurse remained a very important and influential personage in the household.

The poetic citations—particularly the lullabies from Theocritus, Simonides, Sophocles and Euripides are beautiful, and we can only regret that our authoress, who commands a literary style of such pleasing simplicity, has chosen to give them only in the Greek. In an essay intended, in the first instance, for Greek scholars, this was natural and to be expected. But this is a work which can hardly be bettered of its kind, one which will be in demand among professional pediatricists and students of med-

ical history, and no great amount of forecast would be required to predict a second edition. When this comes to pass, we hope that Sister Mary Rosaria will add translations to the citations chosen with such skill, if only that busy physicians may be spared the necessity of painfully picking out the meaning from Bohn's ponies or from the bilinguals in Loeb's Classical Library.

F. H. GARRISON

LEONARDO DA VINCI: Quaderni d'Anatomia V. Ventisei fogli della Royal Library de Windsor. Vasi-muscoli cervello e nervi—anatomia topographica e comparata. Quaderni d'Anatomia VI. Ventitre fogli. . . Proporzioni-funzioni dei muscoli—anatomia della superficie del corpo humano, pubblicate da Ove C. L. Vangensten, A. Fonahn, H. Hopstock. Con traduzione inglese e tedesca. Christiania, Casa editrice Jacob Dybwad, 1916.

We have now before us complete the gigantic work which began to appear in 1911. If the war has hindered the industrious co-workers in their plan of issuing an annual volume regularly, in the beginning of September of each year, it has not hindered them and the doughty publisher from completing the publication by the appearance of the sixth and last volume on September 2, 1916, although the four non-Norwegian collaborators have been called to military duty in the warring nations, two in Germany and Austria, two in England and Italy. We have, then, the complete graphic and textual material of Leonardo on anatomy at hand in an exemplary edition, as far as the Royal Library of Windsor Castle possesses it. Unfortunately, the original material was not accessible, since physicians have had little opportunity for spending afternoons at Windsor for three years. Not only these six volumes, which the publisher, the Heliotype establishment at Christiania, the London publishers in small part, and the three scholars of the northern university with their staff, have given us in

such admirable and splendid style, but these volumes, combined with the two earlier volumes which Piumati in Paris (1898) and Sabachnikoff in Turin (1901) published as Feuillet's A and B respectively, with Italian textual script and English translation, make up the whole. In the Christiania edition, the Italian original text is accompanied by an English and a German translation, closely following the Italian text. The English version is the work of W. Wright. The German rendition was made through the collaboration of M. Holl and K. Sudhoff, Holl having naturally and rightly supervised the anatomical interpretation of the text. We have now a reasonable basis for utilizing and evaluating the material in its relation to the history of anatomy and physiology, a field which Hopstock and Fonahn, as well as M. Holl, have made legitimately and peculiarly their own. While the sixth volume deals almost exclusively with surface anatomy, muscular function and the theory of proportions, the fifth volume, made up of leaves from all of Leonardo's periods of anatomical study, from the Florentine days onward, contains great masterpieces of his skill in the art of anatomical preparation, particularly his delineations of the muscles and tendons of the leg and foot, his original injections of masses of wax into the ventricles of the brain, to the cortex of which, as well as the peripheral nerves, many studies are devoted. The topographical anatomy of the neck is set forth in countless preparations; the supply of muscles, tendons, bloodvessels and nerves of the lower extremity is elucidated by serial sections; the course of the intestines is traced by occasional separation of the intestinal coils from the omentum. Physiological questions, such as the action of the heart and fetal respiration, are also attacked. The careful delicacy of the excellent reproductions will be a constant source of delight to the beholder, from the very first picture of the venous system, which in posture resembles the old

bloodletting manikin, but reveals extensive post-mortem dissection in the delineation, of the course of the veins, or the wonderfully fine silver-crayon drawings of the topographical anatomy of the neck, etc. The publisher has done his part as well, as thoroughly and with the same restless zeal as the worthy editors.

KARL SUDHOFF

(Translated from München. med. Wchnschr., 1916, LXIII, 1622.)

RECOLLECTIONS OF A NEW YORK SURGEON. By Arpad G. Gerster, M.D. Paul B. Hoeber, New York, 1917; 8vo, Cloth, 347 pages, 10 plates, 16 illus. \$3.50.

There are several types of autobiographical writing. In some the writer pours out his heart or lays bare his soul to the audiences for which he writes. Of such a kind were the "Confessions" of St. Augustine and those of Rousseau. Other autobiographies are not much more than a series of literary or critical essays, of which the most interesting example is the recently published "Recollections" of Viscount Morley. Some autobiographies are the simple, straightforward, unvarnished tales of the writer's career. Such was the "Vita Propria" of Cardan and the story of Benjamin Franklin himself.

Dr. Gerster has written his autobiography along the lines of the last type. He tells his story with simplicity, directness and vivacity.

The author has had a much more varied experience than the average surgeon, who has lived a fairly long and very successful life. Dr. Gerster grew up in picturesque Hungary; he finished his education in Vienna; he had an experience in the Austrian army. He made a great adventure to America and a still greater one to Brooklyn; he had the daring later to transfer himself to Manhattan. All of these enabled him to give picturesqueness and a certain dramatic quality to his story.

Readers will be generally more interested, we think, in the story of his home life and early education. This presents to us in a singularly direct and felicitous way the kind of family life which the Hungarian boy led. We must say after all that it was not very remote in method and type from that of New England of forty to one hundred years ago.

We are a little disappointed that the author has not given us more gossip and comment on the surgery of his early days in New York. There were great men in those times and some fierce controversies and personal incidents which Dr. Gerster could have given with great effect. He is, we might say, almost too kind to his medical brethren. The members of that historic band known as the Charaka Club are given a chapter and receive thereby a conditional immortality.

Those who know the author would know

that there is nothing in his book which exploits himself. We should rather be inclined to say that the author is almost too shy in recounting his achievements. He seems more interested in the personalities about him. He shows that he likes to estimate and esteem his fellow men, and confesses that he has been well-treated by those in his profession. He shows himself very keen and very sound on problems of education. He is a lover of art, of music, of books and of all the phases of outdoor life, his own experience in which he felicitously portrays. If the traveler from Mars should pick up the work, he would say, we think, that it tells a story of a very unusual man, progressive, and sometimes aggressive, *tenax propositi*, broadly educated, widely endowed and a mighty good fellow. The book is well printed, and illustrated with some very interesting plates of his family and environment.

CHARLES L. DANA

VOLUME I

NUMBER 4

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VOLUME I

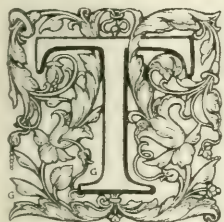
WINTER 1917

NUMBER 4

THE FIRST PRINTED DOCUMENTS RELATING TO MODERN SURGICAL ANÆSTHESIA¹

By SIR WILLIAM OSLER, M.D., F. R. S.

OXFORD, ENGLAND.



THE story of surgical anæsthesia illustrates how long it takes an idea to become effective. The idea of producing insensibility to pain during a cutting operation is of great antiquity, *e. g.*, in Chapter II, 21, of the Book of Genesis. Nor is the word anæsthesia modern, as is sometimes said, and invented by Oliver Wendell Holmes. It occurs, Withington tells me, first in Plato (Timæus) and is used by Dioscorides in the modern sense.

The extraordinary controversy which has raged, and which re-rages every few years, on the question as to whom the world is indebted for the introduction of anæsthesia, illustrates the absence of true historical

perspective and a failure to realize just what priority means in the case of a great discovery.

Why do we not give the credit to Dioscorides, who described both general and local anæsthesia, or to Pliny, or Apuleius or to Hiotho, the Chinaman, who seems to be next in order, or to the inventor of the *spongia somnifera*, or to Master Mazzeo Montagna, in Boccaccio, or to any one of the score or more of men in the Middle Ages who are known to have operated on patients made insensible by drugs or vapors? Why do we not give the credit to Davy, who had the idea, or to Hickman, who had both idea and practice, or to Esdaile, who operated on hundreds of patients in the hypnotic state, or to Elliotson, who did the same; or to Wells, who, in 1844, operated under nitrous oxide, or to Long, who frequently practised ether anæsthesia? Why? Because time out of mind, patients had been rendered insensible by potions

¹ Remarks made on presenting Morton's original papers to the Royal Society of Medicine, London, May 15, 1918.

or vapors, or by other methods, without any one man forcing any one method into general acceptance, or influencing in any way surgical practice.

Before October 16, 1846, surgical anæsthesia did not exist—within a few months it became a world-wide procedure; and the full credit for its introduction must be given to William Thomas Green Morton, who, on the date mentioned, demonstrated at the Massachusetts General Hospital the simplicity and safety of ether anæsthesia. On the priority question let me quote two appropriate paragraphs—"He becomes the true discoverer who establishes the truth; and the sign of the truth is the general acceptance. Whoever, therefore, resumes the investigation of neglected or repudiated doctrine, elicits its true demonstration, and discovers and explains the nature of the errors which have led to its tacit or declared rejection, may certainly and confidently await the acknowledgements of his right in its discovery." (Owen, "On the Archetype and Homologies of the Vertebrate Skeleton," p. 26.) "In science the credit goes to the man who convinces the world, not to the man to whom the idea first occurs" (Francis Darwin, *The Eugenics Review*, 1914). Morton convinced the world: the credit is his.

Morton's original essays are among the *rarissima* not existing, so far as I can ascertain, in any of the general or special libraries of this country. I have been looking for them in vain for many years. In a parcel of his father's papers recently received from William J. Morton of New York there were duplicates of "Letheon" and "Remarks on the Proper Mode of Administering Sulphuric Ether by Inhalation," which I have great pleasure in presenting to the Library. Also a duplicate copy of *The Boston Medical and Surgical Journal* of November 18, 1846, which contains the first printed account of the new procedure, by Dr. Henry J. Bigelow.

In the same journal for December 9th, Dr. J. Collins Warren (*Primus*) gives an account of the first operation at the Massachusetts General Hospital. These four papers stand out in the literature of surgical anæsthesia as fundamental, and truly epoch-making.

Morton called the drug *letheon* and applied for letters patent to secure his rights—not an unethical procedure in the dental profession of America. This led to the publication of his first pamphlet called "Letheon," the bibliography of which some one should undertake. "The medium through which Dr. Morton communicated the results of experiments on etherization to the public, was a 'circular' which he had printed, at his own expense, almost every week. It was at first, as its name imports, a mere letter of advice; but, as it became the receptacle of newspaper articles, and correspondence from every portion of the Union, announcing the success of etherization, it was necessarily enlarged into a large and closely-printed sheet of four pages. Soon this 'Circular' became a pamphlet, and of this five different editions were published, under Dr. Morton's immediate supervision, embodying a digest of all the authentic information, both from Europe and America, on Anæsthesia." (Rice, "Trials of a Public Benefactor," 1859, p. 114.)

The Index Catalogue of the Surgeon General's Library only mentions a fourteen-page pamphlet, 1846, printed by Dutton and Wentworth, Boston. The early form of the circular may be seen on the back page of *The Boston Medical and Surgical Journal*, for December 9th. In the number for November 18th with Bigelow's paper, there is only an advertisement of Morton's courses of instruction in dentistry. The circular appeared first November 26th, and is copied on pages 14-15 of the Letheon pamphlet, fifth edition. This pamphlet is made up of more than eighty

short articles from medical journals and newspapers, and is of special value in giving the popular first-hand impressions relating to the great discovery. There is very little of Morton's—only the circular already referred to, and on page 16 the terms for the "Apparatus, a bottle of the Preparation, instruction, etc."

In 1847 Morton published a forty-four page pamphlet on "The Proper Mode of Administering Sulphuric Ether by Inhalation," Boston, Dutton and Wentworth, printers, in which the original apparatus (now a treasured relic at the Massachusetts General Hospital) is described. In the early part of April he found that a sponge would serve the same purpose and was less dangerous. The greater part of the pamphlet is taken up with general directions, the outcome of the author's experience.

The claims of Morton were very fully stated in a pamphlet published in Paris in 1847 with the title "Mémoire sur la découverte du nouvel emploi de l'éther Sulphurique."

In 1859 he published a small work "On the Physiological Effects of Sulphuric Ether and its Superiority to Chloroform," Boston. So far as I can ascertain, this is his complete output on the subject of anæsthesia, except a posthumous pamphlet on "The Use of Ether as an Anæsthetic at the Battle of the Wilderness." (*Journal of the American Medical Association*, April 23, 1904.)

The third item is No. 16 of Vol. xxxv of *The Boston Medical and Surgical Journal* (then as now, issued weekly) for November 18th, which introduces to the profession modern surgical anæsthesia. Henry J. Bigelow, the distinguished surgeon, had been interested in Morton's private dental cases, and read a paper before the American Academy of Sciences, November 3rd, and at the Boston Society of Medical Improvement, November 9th. It was called "Insensibility during Surgical Operation Produced

by Inhalation," and after referring to the early cases of Warren and of Hayward at the Massachusetts General Hospital, he gives fuller details of the dental cases which he had seen with Dr. Morton. No small share of the early confidence inspired in the profession is due to this temperate statement by Dr. Bigelow, who fully realized the enormous value of the discovery.

In the literature of anæsthesia these are the three fundamental contributions. With them should be placed Collins Warren's account of the first operation, *The Boston Medical and Surgical Journal*, December 9th, and Vol. xxxv of this publication, which contains some twenty-two papers on the subject, illustrating the rapid spread of the practice.

The opportunity here offers to suggest the arrangement of certain subjects in our libraries on an educational basis. For example, why should not the members of the Section on Anæsthesia of this Society undertake to collect and classify their literature on historical lines? Start with the documents that magnetized into life an antique practice, these pamphlets of Morton, Bigelow's paper, Warren's paper, and Volume xxxv of *The Boston Medical and Surgical Journal*. Put these together—all in vellum and lettered in gold!—as the blastoderm from which the enormous literature has developed, which might be arranged on the shelves in ten or more sections. The Index Catalogue of the Surgeon General's Library has a good classification, but for my own collection I have used the following:

I. The general story, as given in such publications as the Jubilee numbers of the *British Medical Journal* and *The Boston Medical and Surgical Journal*; and the text books in which the history of the subject is well given, as Snow, Foy, and so forth.

II. Pre-ether period. On cards, references to Gurlt's "Geschichte der Chirurgie," Bd.

III, p. 621; and Volume I of Simpson's works, from which sources most of the textbook and other descriptions are taken; and to Dioscorides, Pliny, and Apuleius, to the *spongia somnifera*, to Boccaccio and the numerous other early writers. Brief descriptions could be written on the cards. Then, in order, would follow the words of Davy, of Beddoes, the tragic story of Hickman, the remarkable documents relating to anæsthesia produced by compression of arteries, veins, and nerves, Bartholinus' use of cold for local anæsthesia, and the section would conclude with the writings of Esdaile and of Elliotson on hypnotism in surgery. What an education, even to glance at this literature in due sequence on the shelves!

III. The modern period, beginning with Morton, Wells and Jackson; the story of the miserable priority claims, the congressional reports, the publications of the Morton association, the topical literature, showing the introduction of the practice into different countries, the Long literature, and so forth.

IV. In chronological order the subject of anæsthesia in midwifery, embracing everything from Simpson's original pamphlet to the latest popular magazine article on twilight sleep.

V. Chloroform and its introduction. The papers of the discoveries, Guthrie, and so forth, the Simpson pamphlets—his famous British Encyclopædia article, dealing with

the subject of anæsthesia under the word chloroform, which led to the sharp Bigelow-Simpson controversy—the Hyderabad Reports, the B. M. A. and other reports and documents.

VI. Local anæsthesia from Dioscorides and Bartholinus to Kohler, Corning; Halsted, Cushing, and others.

VII. Agents other than ether and chloroform used for inducing anæsthesia, arranged in order of introduction.

VIII. Technique, including the various methods of administration—intravenous, intratracheal—and the literature of apparatus.

IX. Physiology.

X. Pathology.

I speak as an amateur. Doubtless experts could easily arrange a more comprehensive scheme. To separate in literature the quick from the dead is one of the functions of a well-ordered library; but much that we carelessly regard as dead is magnetized into life when put in its historical relation. The plan here suggested—which could be applied in other directions—sustains that continuity, to the study of which this Section is devoted. You remember the rings of Lucretius—well, there is a *vis et vincula librorum*, binding together books, a force just as potent as the *Vis et vincula lapidis*, which supports the rings, and in the literature of anæsthesia this force is derived from the works here presented to the Library.



BYZANTINE MEDICAL FRAGMENTS

By CHARLES SINGER

OXFORD, ENGLAND

UNDER the title of Byzantine Medical Fragments we propose to publish in these pages a series of short texts in later Greek dialects. Each will be accompanied by a translation as literal as possible and by brief notes.

Of late years there has been a widespread revival of interest in the Middle Ages, and a considerable part of the energies of medical historians has been directed to collecting the material for a consecutive and coherent history of mediæval medicine. Except for the purely astrological material, Byzantine sources have, however, been largely neglected. A great store of medical fragments must still lie in the monastic libraries of the East, where enthusiastic collectors have for centuries been seeking the more fairly written and valuable copies of known writers, rejecting those scribbled fragments of medical lore which yet give us a far truer view of the real contemporary outlook than the magnificent volumes of Dioscorides or Galen that are among the treasures of the great European libraries. It is to be hoped that in future more copies or photographs of such fragments may be secured.

The expert palæographer in his just scientific desire to demonstrate continuity has tended always to reproduce the handwriting of the professional scribe rather than the more careless and less typical work of the monastic scribbler. The reading and dating of our fragments may thus often present special difficulty. In view of this and of the scarcity of facsimiles of Byzantine medical palæography, we shall in each case reproduce a photograph of the transcribed text.

I. A GREEK FOURTEENTH-CENTURY PROGNOSTIC FROM THE BLOOD

A large part of mediæval medical lore, both Eastern and Western, was made up of prognosis, the methods of which were drawn from the most diverse sources. Scraps of the genuine science of antiquity, sentences and aphorisms, frequently modified and misunderstood, from the writings of Hippocrates and Galen, often stand side by side with astrological precepts, with the ridiculous mechanical devices of Hermetism or with fragments of primitive folk medicine.

Among the most favorite forms of prognosis were the examination of the urine and of the blood. Urinoscopy and hæmatoscopy occupied a large part of the attention of the physician, and perhaps even more that of the partially trained or untrained pretenders to whose guardianship the people largely trusted its health. Urinoscopy was frequently a specialist's occupation and figures illustrating it are common enough in the MSS. and have been frequently reproduced. Blood-letting was no less specialized and the barber, having performed his venesection, was frequently called upon to give an opinion as to the patient's health and prospects of life from the appearance and behavior of the shed blood. The formation of buffy coat, the separation of serum and clot, the distinction between arterial and venous blood, the alteration in color after exposure to and mixture with air, the process of laking, the rate and character of putrefaction, all phenomena now easily distinguished from one another, were then confused together and the resultant held to indicate the present and future nosological state of the patient. Curiously enough figures illustrating hæmatoscopy appear to be much rarer in

MSS.¹ than figures of urinoscopy, though miniatures of the actual process of blood-letting are very frequently encountered.

The text here transcribed gives a fair idea of the kind of opinion that would thus be formed. It consists of a single page and was written in the late fourteenth or early fifteenth century, probably in the monastery of the Holy Trinity in Chalchis, whence it was brought to the Bodleian Library. The language is that of a well-instructed writer but it is sometimes confused, and in places inaccurate. Thus αἷμα is written for αἷμα, σανδραχιζόν for σανδαραχιζόν and πράσινος for πράσινος. The iota subscript is usually omitted. The handwriting is regular but considerably contracted and there is a peculiar tendency to insert letters above the line without otherwise abbreviating. We would especially point to the word δηλοῖ in lines 19, 26, 28 and 29 where the letters

οι

are written in three vertical rows thus η
δλ,

although the scribe is not pressed for space.

Perhaps the only doubtful reading in the MS. is in the rubricated title, in a hand different to that of the text. The natural reading of the third word of the title is the impossible σείων, but the author of the Bodleian catalogue² would seem correct in giving σωτηρίων, that is σ(ωτη)ρίων, the ρ having lost its tail.

At the end of the MS., in the same handwriting and red ink as the title are the words τέλος ὦχι ἡγού! "Don't think this the end." We are inclined to differ from the anonymous scribe and to think that this is really the end and that the little text is complete in itself.

The initial letter of each paragraph has been rubricated, probably by the scribe who inserted the title and the three final words.

¹ The only figure of a true hæmatoscopy that we can recall is in a fifteenth-century German astrological calendar in the British Museum, MS. additional 17987, folio 101 recto.

We may conclude with a few notes on our English rendering of the contents of the MS.

ἰχὼρ we have left as "ichor." It refers to a puslike appearance in the blood and is probably used to denote the buffy coat.

ῥίγος, which here implies some form of continued fever with chills and not a mere rigor, we have here translated by the indefinite term "ague."

χολή we render "choler" rather than attribute a conception of modern medicine to a writer immersed in the humoral pathology by translating it as "bile."

The debatable word ἔλκος we have rendered "abscess" or "pus," according to the sense of the passage.

αἷμα ἐλκῶδες on line 23 we have rendered "blood as though from an abscess," and αἷμα ῥέον μη ἔας ἐλκώσεως on line 12 we translate "blood running as though from an uncured abscess."

Line 9. αἷμα . . . μαῦρον πηκτόν ὡς τὸ τῆς χελώνης "Blood black-clotted like that of the tortoise." In Greece there are two species of tortoise, the land tortoise, *Testudo græca*, and the fresh-water tortoise, *Testudo clemmys caspica*. We have experimented with the blood of both these animals and find that it clots much more rapidly than normal human blood. On the other hand it contains considerably less hæmoglobin than human blood so that the epithet μαῦρον, black or dark, is inapplicable. The sense would therefore be improved by the insertion of some separative word such as ἀλλά giving the meaning "blood dark but clotted like that of the tortoise."

Line 17, σανδραχιζόν must be for σανδραραχιζόν, a participle of a verb formed from σανδραράχη, realgar (arsenic disulphide, As₂S₂), the red color of which is comparable to blood.

² Henry O. Coxe, "Catalogi Codicum Manucriptorum Bibliothecae Bodleianae Pars Prima, Recensionem Codicum Præcorum continens." Sec. 469, Oxford, 1853.

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Lines 18 and 26, αἷμα ὡς κογχύλη, "blood like a shell," refers doubtless to accidentally coiled or twisted clots which may bear some resemblance to the spiral coils of univalve mollusca.

Transcription, Bodleian Library MS., Roe
15, f. 104v

περὶ αἱμάτων σ(ωτη)ρίων καὶ ὀλεθρίων
'Ἐπὶ μὲν τοῦ ἤρος μαρτίου· ἀπριλλίου·
ιονίου, εἰ φλεβοτομήσῃ τις· καὶ ρεύσῃ αἷμα,
ἔχον θιλάσσειαν χροάν ὡς κόρυς, τῷ τοιοῦτῳ
χειμῶνος ἀρχομένου, θάνατος γίνεται· τῷ
δ' αὐτῷ καιρῷ εἰ μὲν εἰσὶ τὰ αἷματα κατὰ λευ-
κα, καὶ ἰχῶρας ἔχουσι, ρίγη καὶ ποικίλας
ἀσθενείας δηλοῦσιν· (5) ἐὰν δὲ καθαρῶς ρεύ-
σωσι, καὶ ἰχῶρας ποιήσωσι καὶ μετρίως χολῆν
ἔξωσιν, ὑγιῆς ἔσονται.

'Ἐπὶ πλευρίτην δεξιῷ καὶ ἀριστεροῦ, εἰ
μὲν εὐρεθῇ τὸ αἷμα θάινετον· ἢ πράσθηον, ἢ ὡς
καπνίαν θνήσκει· εἰ δὲ λευκὸν καὶ παχύδερμον,
καὶ ἔτω μένων διαπύρσον, ἐκ ρεύσεως κοιλίας
σώζεται ὁ κάμνων.

'Ἐὰν δὲ τις ἰσχνὸς καὶ ξηρὸς πάνυ ὡς ἐπὶ
τῶν ἐκτετηκότων φλεβοτομήσῃ καὶ ρεύσῃ τὸ αἷμα
αὐτοῦ μαῦρον πηκτὸν ὡς τὸ τῆς χελώνης,
ταχέως τελευτᾷ.

'Ἐὰν δὲ τις (10) πλευριτικός ᾗ, ἢ ληθαρ-
γικός· ἢ νεφριτικός φλεβοτομήσῃ, καὶ ρεύσῃ
ἀντὶ αἵματος χολῆν πράσθηος πεπηγεία, ταχέως
τελευτᾷ.

'Ἐὰν δὲ ρεύσῃ αἷμα κατὰ μαῦρον καὶ ἰχῶρας
ποιήσῃ, ρίγη δηλοῖ· εἰ δὲ ἰχῶρα οὐ ποιήσῃ
ἀγαθὸν ἐστὶ.

Αἷμα ρέον μὴ ἰὰς ἐλκώσεως, ἀπαλλοτριῇ
δηλοῖ τῆς μελλούσης νόσου.

Αἷμα ρέον θάινετον ὅλον τοῦ μή φαινομένου
αἵματος, ἐπὶ οἷονδ' ὅποτε μέρος τοῦ ἀγγείου,
δηλοῖ ζῶν ἐξαμηνιαίαν, ἢ τὸ πολὺ ἐνιχυσαίαν·
εἰ δὲ πράσινος εὐρεθῇ (15) ἢ ὅψις τοῦ
αἵματος, πεμπταίος, ἢ ἐβδομαίος ἀποθνήσκει·
εἰ δὲ καὶ ὡς λωρία ἐπὶ τοῦ αἵματος χολῆς
εὐρηθῶσιν· ὥσπερ πολυκυνδύλου γραμμί,
πλευρίτιδα δηλοῖ μεγάλην· εἰ δὲ ρεύσῃ ὥσπερ
ἔλκος, ἢ σφοδρῶδες σήψιν δηλοῖ.

Αἷμα σανδριχλίον μήνους νότῳ θάινει.

Αἷμα ὡς κογχύλη, θανάσιμον ἐστίν.

Αἷμα ἀφρώδες περιπνευμονίαν δηλοῖ καὶ
δῆχα.

Αἷμα ρεύσιν, τὸ ἥμισυ ἔλκος καὶ τὸ ἥμισυ
αἷμα, ταχεῖαν ὑγείαν δηλοῖ.

Αἷμα θρομβῶδες καὶ (20) λευκὸν ὡς γάλα
καὶ δυσωδίαν ἔχον, νεφρίτην δηλοῖ.

Αἷμα μελιοπαχὺ καὶ δυσῶδες, ἔχον λωρία
ὁστρακώδη, θάνατον δηλοῖ χρονιαῖον ἢ ἐξαμνη-
νιαῖον.

Τὸ ἀπὸ φλεβοτομίας αἷμα, ἐὰν μαῦρον ἐστὶ
καὶ ἰχῶρα οὐ ποιήσῃ, ῥίγη δηλοῖ· εἰ δὲ
ποιήσῃ ἰχῶρα, ἀγαθὸν ἐστίν.

Αἷμα ἐλκώδες ὃν ἀπαλλοτριῇ δηλοῖ τῆς
μελλούσης νόσου· θάινετον δὲ φανέν ὅλον καὶ
μηδὲως μετέχον αἵματος, ἐξαμηνιαίου χρόνου
ζῶν δηλοῖ. Εἰ δὲ πράσινος φαίνεται, ἢ ὅψις
τοῦ αἵματος (25) πεμπταίος· ἢ ἐβδομαίος, ὁ
οὕτως ἔχων ἀποθνήσκει.

Εἰ δὲ σχιστῆς ἀρτένικης χροάν ἔχει, θάνα-
τον ἐπάγει· εἰ δὲ καὶ ὡς πίσσα ρεύσῃ, ἐκτικὸν
δηλοῖ.

Εἰ δὲ ρεύσῃ ἔλκος λευκίης ἢ σφοδρῶδες
σήψιν δηλοῖ· εἰ δὲ καὶ ὡς κογχύλης φανείη,
θανάσιμον.

Εἰ δὲ τὸ ἥμισυ ἔλκος καὶ τὸ ἥμισυ αἷμα
ὑγιαίνει ταχέως.

Εἰ δὲ εἰς τὴν μέστην λάκκον ἔχει, θάνατον
δηλοῖ.

Εἰ δὲ μέλαν παχὺ καὶ δυσῶδες, ἔχον λωρία
ὁστρακώδη, θάνατον χρονιαῖον ἢ ἐξαμηνιαῖον
δηλοῖ.

Εἰ δὲ φοινικῶν χροῶμα (30) ἔχει μακρη-
νοσίαν δηλοῖ.

In a later hand

τέλος ὡχέ ἡγοῦ!

Translation

Concerning safe and dangerous bloods.

In Spring, in March, April, or June if one
should be bled and the blood flow, having
on the surface a color like to the sea, to
such a one death comes at the beginning of
the winter. At the same season if bloods are
whitish and have ichors, they denote agues
and various sicknesses. If they should flow

cleanly and [then] form ichors and throw out a moderate amount of choler, they will be healthy.

In right or left pleurisy, if the blood is found purple or greenish or like smoke, he dies. If whitish and with a thick coat, yet remaining red within, the belly being relaxed, the patient survives.

If any one being thin and very dry, as in those who have wasted, should be bled and his blood run dark [but] clotted like that of the tortoise, he quickly ends.

If any one should be pleuritic, or lethargic, or nephritic, and he be bled, and greenish congealed choler should run instead of blood, he quickly ends.

If blood should run very dark and should form ichor, it is well.

Blood running from an uncured abscess denotes deliverance from the coming disease.

Blood running all purple, not having the appearance of blood in any part of the vessel, denotes a life of six months or at most a year. If the appearance of the blood should be found greenish, in five or seven days he dies. If they have found as though streaks of choler upon the blood, like branches of a candelabrum, it denotes a great pleurisy. But if it run like pus or is turbid it denotes putrefaction.

Blood like realgar—he goes for a month in disease.

Blood like a shell is fatal.

Blood like foam denotes peripneumonia and cough.

Blood flowing half pus and half blood denotes a quick recovery.

Blood as though clotted and whitish like milk and having a bad odor denotes nephritis.

Blood thick as honey and malodorous, having streaks like an oyster shell, denotes a gradual death or in six months.

The blood from a phlebotomy, if it is dark and does not produce ichor, denotes ague. But if it make ichor it is good.

Blood as though from an abscess denotes deliverance from the coming disease. But if it appear purple and not resembling blood, it denotes a life of six months' time. But if the appearance of the blood should seem to be greenish, he who has it dies in five or seven days.

If it has separated off a yellowish color it brings forth death. But if it should run like pitch it denotes a hectic fever.

If pus should flow whitish and turbid it denotes putrefaction. But if it should appear like a shell, it is fatal.

If half pus and half blood, he is quickly healed.

If it has a cavity in the midst it denotes death.

If dark, thick and malodorous, having streaks like an oyster shell, it denotes a gradual death or in six months.

If it has a purple color it denotes a long disease.

[In another hand]

Don't think this the end.

II. A LATE GREEK NUMERICAL PROGNOSTIC

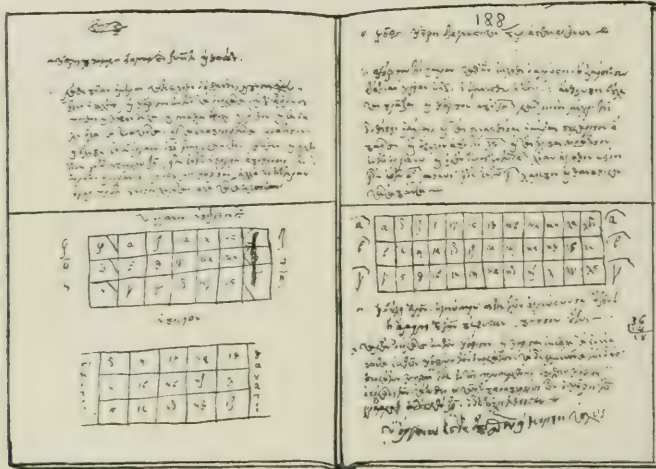
The text here printed is from a MS. on Mount Athos in the monastery of St. Gregory. In the catalogue of that monastery it is numbered 105 (12), and it occupies folios 187 verso to 189 recto. In the catalogue of Professor Lambros¹ it is numbered 652. I have to thank the Abbot George, the present ἡγούμενος, who with great courtesy presented me with the photograph of the MS. on which I have worked. From the character of the handwriting and of the paper there can be little doubt that it is of the eighteenth century. It was probably written in the monastery where it now lies.

The characteristic of Byzantine science, as of other aspects of Byzantine civilization, has been its extraordinarily uniform char-

¹ S. P. Lambros: "Catalogue of the Greek Manuscripts on Mount Athos," vol. I, p. 58, Cambridge University Press, 1895.

acter. From the period when independent Greek thought was finally submerged and Greek Orthodox Christianity had been irrevocably set adrift from the Western Church, the Greek intellect became practically stationary. There were, indeed, local resuscitations of learning, there were times

the past. Our MS. represents one of these disordered and incoherent dreams of antiquity in the last troubled sleep of Hellas before she awoke to reality and to reason at the voice of Adamantios Koraes. There could be no more naïve and childish presentation of the age-old belief in the potency



and places, in the long monotonous history of the Byzantine world, in which there was a better comprehension of the wisdom of the ancients; but there were no true intellectual revivals such as took place in the West in the twelfth century with the arrival of Arabian science, in the thirteenth century during that long process that resulted in the erection of the majestic edifice of Scholasticism, or in the fifteenth century with the great ferment of the Renaissance. The outlook of a Greek monk of the eighth century was in essence identical with that of his representative of the eighteenth. Less change was wrought by a thousand years of history in the Byzantine intellectual world than by a hundred years in the West.

During this long slumber of a thousand years the visions of Greece were always of

of names and numbers than that which is here fathered on the proto-scientist, Pythagoras.

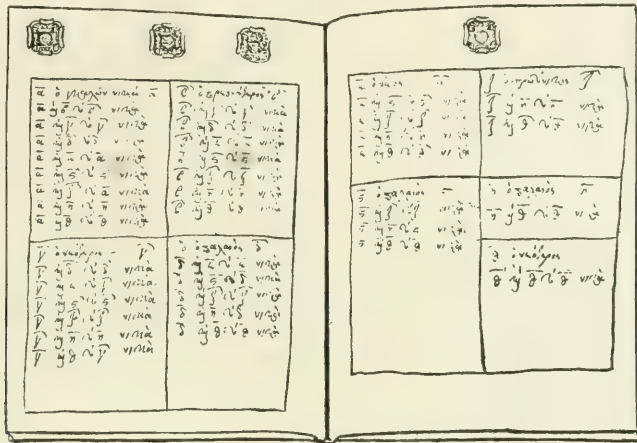
Our MS. is illiterate, sufficiently illiterate to puzzle and shock one trained in classical Hellenic standards, yet not more illiterate than is to be expected in a document of the last years of Greek degradation, emanating from that stronghold of ignorance and fanaticism, the Holy Mountain, where the sole attempt at reform—the foundation of a monastic academy²—so disturbed opinion that it was abandoned as too revolutionary. But though illiterate, our MS. is

² This event took place in 1749 in the monastery of Vathopedi. A short account of it and of the general history and state of the Holy Mountain may be found in Alfred Smidtké, "Das Klosterland des Athos," Leipzig, 1903.

not without linguistic interest. Thus for instance the curious Italianate word *σουμαρισον* (Italian *summare*) reflects for us the Venetian dominance in the fourteenth century.

Our MS. represents but one of the hundred forms in which the belief is expressed that simple mathematical relationships gov-

trary use of accents. The script is difficult, and there still remain one or two doubtful readings. These I have indicated in the notes. For suggestions with reference to these I have to thank Dr. E. T. Withington, Mr. J. S. Scott of Emanuel College, Cambridge, and Mr. Peckham, till lately the



ern not only the phenomena of nature but also the events—both great and small—of human life. That idea, fathered frequently on Pythagoras, became especially popular with the spread of Hermetic and Neoplatonic doctrines. It was very widely held throughout the Dark and Middle Ages and, encouraged by all kinds of mystical and cabalistic writings, it is still commonly encountered among the ignorant and superstitious in every country. With the Greeks such ideas have ever been popular, and have become associated with that passion for prognosis that has always characterized their Medical Systems.

In the transcription I have sought to reproduce the document as it stands, and the original scribe is responsible for the faulty grammar as well as for the somewhat arbi-

trary use of accents. The script is difficult, and there still remain one or two doubtful readings. The defective grammatical construction of that phrase makes a faithful rendering impossible, though its general meaning is clear from the context.

Transcription, Monastery of St. Gregory on Mt. Athos, MS. 105 (12), folio 187v

ψῆφος πιθαγόριος διαγνωστικός ζωῆς τε καὶ θανάτου· μάθε ποῖαν ἡμέραν κατεκλήθη³ ὁ ἀσθενής, καὶ πόσας ἡμέρας εἶχεν ἢ σελήνην, καὶ ψήφισον αὐτῶν τὰ ὀνόματα, καὶ τοῦ ἀρρώστου πρόθεας⁴ καὶ ψήφους δέκα, καὶ συνάψας ἤφιλε⁵, καὶ ῥίψον καὶ ἔκβαλε ὄλα τὰ τριά-

³ for κατεκλήθη.

⁴ for πρόσθεας.

⁵ for ὠφῆλον from ὠφαιρῶ.

κοντα καὶ τὰ ἐναπολειφθέντα κράτεσον, καὶ
θ' ἔλεπε ἐν τῷ ὀργάνῳ ὅπου εἶναι γραμμένῳ
κάτωθεν, καὶ εἰ μὲν εὐρῆς ἐν τῷ ὑπεργείῳ ζῆ·
ἡ δὲ ἐν τῷ ὑπογείῳ ἀποθνήσκει· τὴν δὲ πρώτην
ἡμέραν τοῦ ἀρρώστου μὴν ψηφίσσης, ἀλλὰ τὴν
δευτέραν· ἡ γὰρ πρώτη οὐ νόσος λέγεται ἀλλὰ
κατακλυσία ⁶.

Τὸ ὄργανον ὑπέργειον·

Φ	α	ζ	ια	κ	κς	ζ
ω	β	θ	ιγ	κα	κη	ω
ς	γ	ι	ιδ	κγ	ις	ῆ

ὑπόγειον

σ'	δ	η	ιη	κε	ιθ	θ'
κ						α
ο	ε	ιβ	κβ	κς	λ	ν
τ						α
ο	ς	ιε	κδ	κθ	ις	ο

folio 188r

Ψῆφος διαγνωστικός περὶ ἀσθενημένων
ψηφισον τὴν ἡμέραν καθ' ἣν ἐκλήθη ὁ ἄρρω-
στος, ἢ ἡμέισευσεν ⁷ διὰ τιναν χρεῖαν αὐτοῦ,
ἢ ἐγεννήθη, ἢ ὅτινι τις ἄνθρωπος δοῦλεται
πράξει, καὶ ψηφισον ἀπὸ τῆς ἡμέρας ⁸
μηνὸς μέχρι τῆς δοθείσης ἡμέρας, καὶ τὰς συνα-
χθεσας ἡμέρας σομαρίσον ⁹ ἅπαντας,
καὶ ἡφυλον ¹⁰ ἀπὸ τῆς λς καὶ τὰς λοιπὰς
κράτησον ἐν τῷ ὀργάνῳ, καὶ εἰ μὲν εὐρῆς ἐν
τῷ α' λίαν ἀγαθὸν ἔστιν, εἰ δὲ ἐν τῷ θ' μεσέως,
εἰ δὲ ἐν τῷ γ' χαλεπὸν καὶ θανάσιμον κατὰ
πάντα·

⁶ for κατακλυσία.

⁷ The reading of this word is difficult. I have regarded ἡμείσευσεν as equivalent to ἡμεσευσεν derived from a hypothetical verb ἡμεσεύω (cp ἡμεσος) "to be in urgent need."

⁸ The word that I transcribe as ἡμέρας seems in the original to be μέας.

α	α	δ	ζ	ι	ιγ	ις	ιθ	κβ	κε	κη	λα	λδ	α
β	β	ε	η	ια	ιδ	ις	κ	κγ	κς	κθ	λβ	λε	β
γ	γ	ς	θ	ιβ	ιε	ιη	κα	κδ	κς	λ	λγ	λς	γ

εἰ δοῦλει εὐρεῖν, ἢ γινώσκειν ὅστις τῶν
ἀγνώστων σας τὸ ζῆν ἔχει ἢ ἄμειρος τοῦ ζῆν
πέφυκεν. ποίησον οὕτως—

τὰ μὲν ὀνόματα αὐτῶν ψηφισον, καὶ ψηφίσας
ἐκβάλε τὰ ἐννέα πάντα ἐκ τῶν ψηφίων τῶν ὀνο-
μάτων, τὰ δὲ ἐμμένοντα τῶν δύο ὀνομάτων
ψηφία ἴδε ἐν τοῖς προειρημένοις ὅπισθεν ψηφί-
οις, καὶ εἰ ὀνόματος τῶν κάτωθεν νικῶντι
παραπλησίως ὧν ὁ ψῆφος τῷ γράμματι αὐτὸς
μὲν ζῆ, ὁ δὲ ἄλλος τέθηγкен.

Τὸ ὄργανον ἐστὶν ὅπισθεν καὶ θεώρισον κα-
λῶς·

α ὁ γηθίων (11) νικάει α καὶ β τὸ β νικάει α καὶ γ τὸ γ νικάει α καὶ δ τὸ δ νικάει α καὶ ε τὸ ε νικάει α καὶ ζ τὸ ζ νικάει α καὶ η τὸ η νικάει α καὶ θ τὸ θ νικάει	β ὁ πρεσβύτερος β β καὶ γ τὸ γ νικάει β καὶ δ τὸ δ νικάει β καὶ ε τὸ ε νικάει β καὶ ζ τὸ ζ νικάει β καὶ η τὸ η νικάει β καὶ θ τὸ θ νικάει
γ ὁ νεότερος—γ γ καὶ δ τὸ δ νικάει γ καὶ ε τὸ ε νικάει γ καὶ ζ τὸ ζ νικάει γ καὶ η τὸ η νικάει γ καὶ θ τὸ θ νικάει	δ ὁ παλαιός δ δ καὶ ε τὸ ε νικάει δ καὶ ζ τὸ ζ νικάει δ καὶ η τὸ η νικάει δ καὶ θ τὸ θ νικάει
ε ὁ νέος ε ε καὶ ζ τὸ ζ νικάει ε καὶ η τὸ η νικάει ε καὶ θ τὸ θ νικάει	ζ ὁ πρωτόναικος ζ ζ καὶ η τὸ η νικάει ζ καὶ θ τὸ θ νικάει
η ὁ παλαιός η η καὶ θ τὸ θ νικάει	θ ὁ νεότερος θ θ καὶ α τὸ α νικάει

NOTE—The letter "ρ" in this article should be in the archaic form, but the type is not procurable. Ed.

⁹ σομαρίσον doubtless from Italian *summare*.

¹⁰ ἡφυλον see note 5 ante.

¹¹ The reading γηθίων is doubtful. It is perhaps an adjective formed from γηθος. Another possibility is νικαίων.

Translation

Pythagorean Diagnostic Calculation of Life and also of Death.

Ascertain what day the patient took to his bed and how many days the moon had, and reckoning [the numerical value of] their names and that of the sick man, put them together and add ten. And having summed them up, subtract, take away and divide by thirty [*lit.* cast out all the thirties].¹² Then taking the remainder, look where [the number] is in the table written below. And if thou findest it in the superterranean section he lives, but if in the subterranean he dies. But do not reckon the first day of the illness but the second; for the first is not regarded as [a day of the] disease but as [the day of] taking to bed.

Superterranean Table

L I F E	1	7	11	20	26
	2	9	13	21	28
	3	10	14	23	16

Subterranean

D E A T H	4	8	18	25	19
	5	12	22	27	30
	6	15	24	29	17

Diagnostic calculation of those who have been taken sick.

Reckon the day in which the patient took to his bed, or fell into some urgent need, or [on which] he was born, or on which a man wishes to do something. Reckon also [the number of days] from the first day of the month until the given day. Then putting these days together add them

¹² I am indebted to Dr. Withington for this interpretation, which fits in well with the tables.

all up and subtract from 36, and refer that which remaineth to the table [below]. Now if thou findest it in the 1 it is full well, if in the 2 of middling sort, but if in the 3 it is ill and mortal above all.

1	1	4	7	10	13	16	19	22	25	28	31	34	1
2	2	5	8	11	14	17	20	23	26	29	32	35	2
3	3	6	9	12	15	18	21	24	27	30	33	36	3

If thou wishest to find or to know whether one unknown to thee [still] walks in life or is without lot among the living, do thus:

Cipher out their names, and having ciphered them divide them by nine [*lit.* cast out all the nines from the ciphers] and seek the remaining numbers of the two names among the aforesaid ciphers overleaf and if.....

the one is alive, but the other is dead.

The table is overleaf and examine it well.

folios 188v and 189r

1 the . . (13) victory (hath) 1 1 and 2. The 2 (hath) victory 1 and 3. The 3 (hath) victory 1 and 4. The 4 (hath) victory 1 and 5. The 5 (hath) victory 1 and 6. The 6 (hath) victory 1 and 7. The 7 (hath) victory 1 and 8. The 8 (hath) victory 1 and 9. The 9 (hath) victory	2. The elder (is) 2. 2 and 3. The 3 (hath) victory 2 and 4. The 4 (hath) victory 2 and 5. The 5 (hath) victory 2 and 6. The 6 (hath) victory 2 and 7. The 7 (hath) victory 2 and 8. The 8 (hath) victory 2 and 9. The 9 (hath) victory
3. The younger (is) 3 3 and 4. The 4 (hath) victory 3 and 5. The 5 (hath) victory 3 and 6. The 6 (hath) victory 3 and 7. The 7 (hath) victory 3 and 8. The 8 (hath) victory 3 and 9. The 9 (hath) victory	4. The ancient (is) 4 4 and 5. The 5 (hath) victory 4 and 6. The 6 (hath) victory 4 and 7. The 7 (hath) victory 4 and 8. The 8 (hath) victory 4 and 9. The 9 (hath) victory
5. The young (is) 5. 5 and 6. The 6 (hath) victory 5 and 7. The 7 (hath) victory 5 and 8. The 8 (hath) victory 5 and 9. The 9 (hath) victory	7. The chief victor (is) 7 7 and 8. The 8 (hath) victory 7 and 9. The 9 (hath) victory
6. The ancient (is) 6. 6 and 7. The 7 (hath) victory 6 and 8. The 8 (hath) victory 6 and 9. The 9 (hath) victory	8. The ancient (is) 8 8 and 9. The 9 (hath) victory
	9. The younger 9 and 9. The 9 (hath) victory

¹³ See note 11 to text.

THE LEGISLATIVE AND ADMINISTRATIVE HISTORY OF THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY DURING THE REVOLUTIONARY PERIOD (1776-1786)

By COLONEL WILLIAM O. OWEN, U. S. ARMY

CURATOR, ARMY MEDICAL MUSEUM, WASHINGTON, D. C.

SECTION III

INTRODUCTION

THIS, the third installment of the history of the medical department during the revolutionary period, deals almost entirely with the establishment of hospitals, their personnel, and expenditures.

It is interesting to compare the conditions then existing with those obtaining in our time. The medical department does not seem to have been regularly incorporated with the Army until May 28, 1781, when the Medical Committee was discontinued and its business handled by the Board of War. It was even considered necessary as late as September 30, 1780, to state that hospital and medical officers "shall be subjected to trial by courts-martial for all offences, in the same manner as officers of the line of the army."

Those acquainted with the organization of the present military hospital, will read with interest the report of the Medical Committee for March 22, 1781.

Even in those days much red tape was required in the procuring of medicines and instruments, as evidenced by the resolution of July 23, 1782. However, the apothecary evidently held a more important position than under the present regime.

A strong contrast is struck in the salary of the nurses—four dollars per month and one ration per day. But how familiar is the motion of April 13, 1781, ordering that a certain sum of money be placed in the hands of one Nathan Brownson "to pay

three months' salary and wages due to the officers and others employed in the hospital . . ."

The regulation under date of September 28, 1780, might well obtain in our own time: "That no person concerned in trade, on his own account, shall be suffered to act as an officer in the hospital or medical department of the army:"

Upon dismissal of a soldier from the hospital there seems to have been difficulty in locating his proper clothing as evidenced by the following extract: "The Steward shall also receive the spare regimental arms and accoutrements and cloathing of each soldier admitted into the Hospital keeping entries of and giving receipts for every article received, which when the soldier shall be discharged, shall be accounted for by the said Steward, with the Commanding Officer of the regiment to which such soldier belonged, or other proper person, and shall also take charge of the hospital cloathing."

For the sake of comparison we might note under date of July 24, 1781, the mildness of the enemy's cruelty toward one Robert Henry who, on being taken prisoner by the enemy, was only "stripped of all his cloathing."

Generous provision was made for the invalidated by a resolution of May 1, 1783, and, by the order of September 30, 1780, medical officers were entitled to grants of land equal to those of officers in the army.

—EDITOR.

II. FROM JOURNALS OF THE CONTINENTAL CONGRESS (1774-83) (*Continued*)

August 22, 1780. 755

A letter from Doctor W. Shippen, director general, was read:

Ordered, That it be referred to a committee of three:

August 28, 1780. 787-8

The committee, to whom was referred the letter, of 22d, from Doctor W. Shippen, D(irector)* G(eneral), brought in a report; Whereupon,

The Committee to whom, D. Shippen Direc^t Gen^l letter of the 22nd instant was referred, Report,

That that part of the letter which respects supplies of Forage for the Horses belonging to officers of the Hospital Department, together with two letters received by the Committee since, from the Director General, be referred to the Board of War to take order.

The Committee ask leave to sit again.

Extract of a letter of D. Shippen Aug. 22nd 1780
"I am informed to day by the Dep^{ty} Quarter Master of this State that he will not supply our department with any more Forage, unless he is authorised so to do by an order of Congress, which I flatter myself will be given immediately."¹⁰⁷

Resolved, That that part of the letter, which respects supplies of forage for the horses belonging to officers of the hospital department, together with two letters received by the committee from the director general, be referred to the Board of War to take order.

September 9, 1780. 814

The committee, to whom was referred the letter of 22 August, from Doctor Shippen, director general, brought in a report, which was read:

Ordered, That a member be added to the Medical Committee, in the room of Mr. (Samuel) Holton, who is absent:

The member chosen, Mr. (Theodorick) Bland.

September 11, 1780. 819

Ordered, That Wednesday next be assigned for the consideration of the report of the committee on Doctor W. Shippen, director general's letter, respecting the hospital department.

September 19, 1780. 837

A letter, of this day, from Doctor W. Shippen, director general, was read:

Ordered, That it be referred to the Medical Committee.

September 22, 1780. 847

Congress resumed the consideration of the report of the committee on the medical department, and on the consideration of the following paragraph, viz.
"That the several officers whose pay is estab-

lished as above, except the clerks and stewards, shall at the end of the war be entitled to a certain provision of land in the proportion following, viz.

The director to have the same quantity as a brigadier general. Chief physicians and surgeons and apothecary the same as a colonel. Physicians and surgeons and apothecary the same as lieutenant colonel. Regimental surgeons and assistants to the purveyor and apothecary, the same as a major. Hospital and regimental surgeons' mates, the same as a captain."

A motion was made by Mr. (Frederick A.) Muhlenberg, seconded by Mr. (Theodorick) Bland, to amend the paragraph by inserting after the words, "intitled to" the words following, viz. "half pay in the same manner and under like restrictions as officers of the line"; and on the question to agree to the amendment, the yeas and nays being required by Mr. (John) Fell,

So it was resolved in the affirmative.

September 23, 1780. 853

The committee, to whom was re-committed part of the report on the hospital department, having brought in a farther report, Congress resumed the consideration thereof, and made some progress.

Ordered, That the director general report the names of all the officers in the hospital department from the director to the junior surgeons inclusive, with the dates of their respective commissions.¹⁰⁸

September 25, 1780. 854

The director general, having made a return of the officers of the hospital;¹⁰⁹

Ordered, That it be referred to the Medical Committee.

September 28, 1780. 871

The Medical Committee, to whom was referred the return made by Doctor Shippen, delivered in a report.

September 30, 1780. 876-88

Congress resumed the consideration of the report on the hospital department, when a motion was made by Mr. (Roger) Sherman, seconded by Mr. (Nicholas) Van Dyke, to reconsider that part of the report, viz. "That the several officers whose pay is established, except the stewards and ward masters, be intitled to half pay, in the same manner and under like restrictions as officers of the line;"

And on the question for reconsideration, the yeas and nays being required by Mr. (Roger) Sherman,

So it was resolved in the affirmative.

A motion was made by Mr. (John) Fell, seconded by Mr. (William Churchill) Houston, to strike out the words, "half pay in the same manner and under like restrictions as officers of the line."

And on the question shall those words stand, the

* Material placed in parentheses appeared in brackets in the original MS.

¹⁰⁷ This report, in the writing of Frederick A. Muhlenberg, is in the *Papers of the Continental Congress*, No. 136, IV, folio 541.

¹⁰⁸ Here were inserted the resolutions on the hospital service, but Thomson noted in the margin "reconsidered and amended 30th." They are printed under September 30, 1780, *post*, where the changes are noted.

¹⁰⁹ Dr. Shippen's letter transmitting the return is in the *Papers of the Continental Congress*, No. 78, XX, 567.

yeas and nays being required by Mr. (Roger) Sherman, . . .

So it passed in the negative and the words were struck out.

Congress proceeded in the consideration of the report, and the same being amended, was agreed to, as follows:¹¹⁰

Whereas, the late regulations for conducting the affairs of the general hospital are in many respects defective; and it is necessary that the same be revised and amended, in order that the sick and wounded may be properly provided for and attended, and the business of the hospitals conducted with regularity and economy; therefore,

Resolved, That there be one director of the military hospitals, who shall have the general direction and superintendence of all the hospitals to the northward of North Carolina; that, within the aforesaid limits, there be three chief hospital physicians, who shall also be surgeons; one chief physician, who shall also be a surgeon, to each separate army; fifteen hospital physicians, who shall also be surgeons; twenty surgeons' mates for the hospitals: one purveyor, with one assistant; one apothecary; one assistant apothecary; [and to each hospital one clerk who shall also be paymaster,]* a steward, matron, orderly men, and nurses, as heretofore:

That the director, or, in his absence, one of the chief hospital physicians, be empowered and required, with the advice and consent of the Commander in Chief, or commander of a separate army, to establish and regulate such a number of hospitals, at proper places, for the reception of the sick and wounded of the army, as may be found necessary:

That the director be authorised and instructed to enjoin the several chief hospital physicians, and other officers of the hospitals under his superintendence, to attend at such posts or stations as he may judge proper, and also to attend and perform such duties, at any post or place, as a change of the position of the army, or other circumstances, may from time to time make necessary, and shall be required by the Commander in Chief; and that, in case of any dispute concerning their seniority or precedence, the director shall determine the same in the first instance, the party supposing himself aggrieved being at liberty to appeal for redress to the Medical Committee:

That in time of action, and on any other emergency, when the regimental surgeons are not sufficient in number to attend properly to the sick and wounded that cannot be removed to the hospitals, the director, or, in his absence, the nearest chief hospital physician, be empowered and required, upon request of the chief physician and surgeon of the army, to send from the hospitals under his care, to the assistance of such sick and wounded, as many surgeons as can possibly be spared from the necessary business of the hospitals:

That the director, or, in his absence, two of the chief hospital physicians, shall make out and deliver, from time to time, to the purveyor, proper es-

timates of hospital stores, medicines, instruments, dressings, and such other articles as may be judged necessary for the use of the hospitals; also direct the apothecary or his assistant, to prepare and deliver medicines, instruments, dressings, and other articles in his possession to the hospitals and surgeons of the army and navy, as he or they may judge necessary:

That the director authorise and instruct the purveyor and apothecary to supply, for the use of the regimental surgeons, such medicines and refreshments as may be proper for the relief of the sick and wounded, before their removal to a general hospital, and to be dispensed under the care, and at the direction of the chief physician of the army:

That the director, or, in his absence, the chief hospital physicians, respectively, be empowered occasionally to employ second mates, when the number of the sick shall increase so as to make it necessary, and to discharge them as soon as the circumstances of the sick will admit:

That the director, or, in his absence, the chief hospital physicians, respectively, shall appoint a ward master for each hospital, to receive the spare regimental cloathing, arms, and accoutrements of each soldier admitted therein, keeping entries of and giving receipts for every article received, which, when the soldier shall be discharged, shall be accounted for by the said ward master with the commanding officer of the regiment to which such soldier belonged, or the officer directed to take charge of the convalescents from the said hospital; or, in case of the death of the soldier, shall be accounted for with, and delivered to the quartermaster of the regiment to which the said soldier belonged; and the ward master shall receive and be accountable for the hospital cloathing, and perform such other services as the chief hospital physician shall direct.

That the director shall make returns of all the sick and wounded in the hospitals, once every month, to the medical committee, together with the names and ranks of all the officers and others employed in the several hospitals:

That the director be required to employ such part of his time as may be spared from the duties before pointed out to him, in visiting and prescribing for the sick and wounded of the hospitals; and that he pay particular attention to the conduct of the several officers in the hospital department, and arrest, suspend and bring to trial, all delinquents within the same:

That the duty of the chief hospital physician shall be, to do and perform all the duties herein before enjoined them to do in the absence of the director; to receive and obey the orders of the director, made and delivered to them in writing, to superintend the practice of physick and surgery in the hospitals put under their particular care by the director, or which, by the order of the commander in chief or the commander of a separate army, may be by them established; to see that the hospital physicians and other officers attending the same, do their duty; and make monthly returns to the director, of the state and number of the sick and wounded in the hospitals under their care; and also make to the director, and to the medical committee, of all delinquent officers,

¹¹⁰ From here the entries are in Thomas Edison's writing.

*Material in brackets was cancelled in the original MS.

in order that they may be speedily removed or punished; and to take measures that all such sick and wounded as are recovered and fit for duty be delivered weekly to the officer of the guard, to be conducted to the army: when present at any hospital, to issue orders to the proper officers for supplying them with necessaries; and generally, in the absence of the director, to superintend and controul the business of such hospitals, suspend delinquent and remove unnecessary non-commissioned officers, making report to the director; and, when in their power, to attend and perform or direct all capital operations:

That the hospital physicians shall take charge of such particular hospitals as may be assigned them by the director: They shall obey the orders of the director, or in his absence, of the chief hospital physician: They shall have power to suspend officers under them, and to confine other persons serving in the hospitals under their charge, for negligence or ill-behaviour, until the matter be regularly inquired into: They shall diligently attend to the cases of the sick and wounded of the hospitals under their care, administering at all times proper relief, as far as may be in their power: They shall respectively give orders, under their hands, to the assistant purveyor or steward at the hospital, for the issuing provisions and stores, as well as for the procuring any other articles that the exigencies of the hospital may require, and which the store is not provided with, having always a strict regard to economy, as well as the welfare of the sick then to be provided for: They shall make weekly returns to the nearest chief hospital physician, of the state of the hospitals under their respective care.

The mates shall each take charge of and attend the patients assigned them, and perform such other duties as shall be directed by the director, chief or other physicians and surgeons.

The chief physician and surgeon of the army shall be subject to the orders and controul of the director: His duty shall be to superintend the regimental surgeons and their mates, and to see that they do their duty: To hear all complaints against the said regimental surgeons and mates, and make report of them to the director, or, in his absence, to the Commander in Chief or commanding officer of a separate army, that they may be brought to trial by court-martial for misbehaviour: To draw for and receive from the purveyor a suitable number of large strong tents, beds, bedding and hospital stores, and from the apothecary, or his assistant, proper medicines, for such sick and wounded persons as can not be removed to the general hospital with safety, or may be rendered fit for duty in a short time. He shall also see that the sick and wounded, while under his care, are properly attended and provided for, and conveyed, when fit to be removed, to the general hospital; for which last purpose, he shall be supplied by the quartermaster general, with a proper number of convenient wagons and drivers; he shall have a steward, which he is to appoint, to receive and properly dispense such articles of diet and refreshment as shall be procured for the sick; and also shall appoint such a number of nurses and orderly men as may be necessary for the attendance of the

sick and wounded under his care. He shall cause daily returns to be made to him of all the sick and wounded which have been removed to the hospitals, all that remain in the hospital tents, all that are become fit for duty, all that are convalescent, and all who may have died, specifying the particular maladies under which the sick and wounded labour, and shall make a monthly return thereof to the director, who shall add it to his general hospital returns, to be transmitted monthly to the Medical Committee.

That whenever any regimental surgeon or mate shall be absent from his regiment, without leave from the chief physician and surgeon or commander of the army where his duty lies, the said chief physician and surgeon shall have power to remove such surgeon or mate and forthwith appoint another in his stead.

That the purveyor provide, or cause to be provided, all hospital stores, medicines, instruments, dressings, utensils, and such other articles as shall be prescribed by the written order of the director, or two of the chief hospital physicians, and deliver, or cause the same to be delivered, upon written orders, under the hands of the director, or chief hospital physician, or one of the hospital physicians, having the charge of a particular hospital, or of a chief physician and surgeon of the army, which, with receipts thereon for delivery of the same, shall be his sufficient vouchers. He shall be allowed a clerk, and as many store keepers as occasion may require, and the director shall approve of. He shall also pay the salaries of the officers, and all other expences of the hospitals. He shall render his accounts every three months to the Board of Treasury for settlement, and make application for money to the Medical Committee, before whom he shall lay estimates of articles necessary, which shall previously have been approved and signed by the director or two of the chief hospital physicians; at the same time he shall render to them an account of the expenditure of the last sum of money advanced to him; and the said Medical Committee shall lay such estimates before Congress, with their opinion thereon:

That the assistant purveyor shall procure such supplies, and do and perform such parts of the purveyor's duty, as by him shall be particularly assigned to him.

That the apothecary and his assistant receive, prepare and deliver medicines, instruments and dressings, and such other articles of his department, to the hospitals and army, on orders in writing from the director, or either of the chief hospital physicians, or chief physician and surgeon of the army; and that he be allowed as many mates as occasion may require, and the director shall approve of:

That the director, or in his absence, the chief hospital physician, shall appoint a steward for each hospital, whose duty it shall be to purchase vegetables and other small articles, under the direction of the purveyor, and to receive hospital stores from the purveyor, and provisions from the commissary general, and issue the same for the use of the sick and wounded, agreeably to the order of the physician and surgeon attending such hospital; the steward to account with the purveyor for all such issues:

That the director, or, in his absence, the chief

hospital physician, appoint a proper number of matrons, nurses, and others, necessary for the regular management of the hospitals, and fix and ascertain their pay, not exceeding the sums heretofore allowed; and point out and prescribe their particular duties and employments, in writing, which they are enjoined to observe and obey:

That the director, with two chief hospital physicians, be empowered to fix the pay of second mates, and of such clerks, store keepers, and other persons, as may occasionally be employed; and also make such regulations, and point out and enjoin, in writing, such further particular duties for the several officers in the hospital department, as they may judge necessary for the regular management of the same; which duties shall always be consistent with, and in no wise contradictory to any of the duties herein before particularly enumerated, and which being reported to, and approved of by the Medical Committee, shall thereupon become obligatory to all those concerned:

That the quartermaster general furnish the hospital department, from time to time, as occasion may require, with such a number of horses and wagons as may be necessary for removing the sick and wounded, and for transporting the hospital stores; but that no other horses than those belonging to the officers of the department, for which forage may be herein allowed, be kept separately and at the expence of the department:

That no person concerned in trade, on his own account, shall be suffered to act as an officer in the hospital or medical department of the army:

That no officer or other person in the hospital department, except the sick and wounded, be permitted to use any of the stores provided for the sick:

That the director, chief hospital physicians, and the chief physicians and surgeons of the army, physicians and surgeons, purveyor, apothecary, assistant purveyor, and assistant apothecary, be appointed and commissioned by Congress; the regimental surgeons and mates to be appointed as heretofore:

That the director, with the advice and concurrence of two of the chief hospital physicians, appoint all hospital mates, which appointments shall be certified by warrants under the hand of the director; in which appointments no person shall be admitted under the age of twenty-one years:

That all the officers in the hospital or medical departments, shall be subjected to trial by courts-martial for all offences, in the same manner as officers of the line of the army.

Resolved, That the pay and establishment of the officers of the hospital department, and medical staff, be as follows:

Director, one hundred and fifty dollars per month, two rations for himself, and one for his servant, per day, and forage for two horses:

Chief physicians and surgeons of the army and hospitals, each, one hundred and forty dollars per month, two rations per day, and forage for two horses:

Purveyor and apothecary, each, one hundred and thirty dollars per month:

Physicians and surgeons of the hospitals, each,

one hundred and twenty dollars per month, one ration per day, and forage for one horse:

Assistant purveyors and apothecaries, each, seventy-five dollars per month:

Regimental surgeons, each, sixty-five dollars per month, one ration per day, and forage for one horse:

Surgeons' mates in the hospitals, fifty dollars per month, one ration per day:

Surgeons' mates in the army, forty-five dollars per month, one ration per day:

Steward for each hospital, thirty-five dollars per month, one ration per day:

Ward master for each hospital, twenty-five dollars per month, one ration per day.

Resolved, That none of the aforesaid officers, or other persons employed in any of the hospitals, be entitled to rations of provisions or forage when on furlough.

Resolved, That the chief physician of the army be allowed a two horse covered wagon for transporting his baggage:

That the several officers above mentioned shall receive their pay in the new currency, emitted pursuant to a resolution of Congress of the 18th day of March last; and that they be allowed and paid at the rate of five dollars of said currency per month for every retained ration; and shall each be entitled annually to draw cloathing from the stores of the clothier general, in the same manner and under the same regulations as are established for officers of the line, by a resolution of Congress of the 25th November, 1779:

That the returns for cloathing for officers in the medical staff (regimental surgeons and their mates, who are to draw with the regimental staff, excepted) be signed by the directors, or one of the chief hospital physicians; and such cloathing shall be delivered either by the clothier general or any sub-clothier in the state in which the officer to receive cloathing shall reside, in the same manner as is provided in the cases of other staff officers not taken from the line:

That the several officers whose pay is established as above (except the stewards and ward masters) shall at the end of the war be entitled to a certain provision of land, in the proportion following, viz.

The director to have the same quantity as a brigadier-general;

Chief physicians and purveyor, the same as a colonel;

Physicians and surgeons and apothecary, the same as a lieutenant colonel;

Regimental surgeons and assistants to the purveyor and apothecary, the same as a major;

Hospital and regimental surgeons' mates, the same as a captain;

That the former arrangements of the hospital department, and all resolutions heretofore passed touching the same, so far as they are inconsistent with the foregoing, be repealed, excepting that the hospitals in the southern department, from North Carolina to Georgia, inclusive, be continued under the same regulations as heretofore, until the further order of Congress.¹¹¹

¹¹¹ Here Charles Thomson resumes the entries.

October 2, 1780. 889

Congress took into consideration the report of the Medical Committee on the letter, of 24 September, from the director general, together with the returns of the officers in the hospital department; and thereupon,

The Medical Committee, to whom the Director General's letter of the 24th inst. together with the Return of the Officers in the Hospital Department was referred, beg leave to report:

That they have conferred with the Director General and other officers of the Department, and have made out a new Return, of the General Officers, the Senior and Junior Surgeons, together with the Dates of their respective Commissions, which they submit to Congress.

Resolved, That on Thursday next Congress will proceed to the election of the director, chief physicians, purveyor-apothecary and their respective assistants, and the physicians of the military hospitals.¹¹²

October 6, 1780. 908

Congress proceeded to the election of officers in the hospital department, and the ballots being taken, Doctor William Shippen, jr. was elected director-general; Doctor John Cochran, chief physician and surgeon of the army; Doctor James Craik, Doctor Malachi Treat, Doctor Charles M'Knight, chief hospital physicians.

October 7, 1780. 909-10

Congress proceeded in the election of officers in the hospital department, and the ballots being taken, Thomas Bond, jun. was elected purveyor; Isaac Ledyard, assistant purveyor; Doctor Andrew Craigie, apothecary; William Johonot, assistant apothecary; Doctors James Tilton, Samuel Adams, David Townshend, Henry Latimer, Francis Hagan, Philip Turner, William Burnet, John Warren, Moses Scott, David Jackson, Bodo Otto, Moses Bloomfield, William Eustis, George Draper, Barnabas Binney, hospital physicians and surgeons.

On motion of the medical committee,

Resolved, That Doctor Matthew Maus be appointed surgeon to the regiment of invalids commanded by Colonel L. Nicola, and that Colonel Nicola be authorised to appoint a proper surgeon's mate to the said regiment, when the number of sick shall make it necessary.

October 17, 1780. 935

On motion of the Medical Committee,

Ordered, That Doctor Isaac Forster and Doctor Jonathan Potts deliver all public stores in their possession to Doctor Thomas Bond, purveyor of the hospitals, or his order, taking duplicate receipts for the same, and transmitting one of each to the Board of Treasury.

October 21, 1780. 962

A letter, of 4, from W. Rickman, was read; Whereupon,¹¹³

¹¹² This report is in the *Papers of the Continental Congress*, No. 22, folio 27.

¹¹³ This letter is in the *Papers of the Continental Congress*, No. 78, XIX, folio 319.

Ordered, That Dr. Rickman be informed, that pursuant to his former request, he is left out in the new arrangement of the hospital department.

October 30, 1780. 992

That as Major General Greene has expressed an earnest desire to have Doctor James McHenry as an aid de camp upon the southern command, the said Major General Greene be authorised to employ the said Doctor James McHenry as one of his aids, on his command in the southern department; and that the said Doctor McHenry while so employed be intitled to the rank of major by brevet.

November 1, 1780. 1002

The Medical Committee delivered in a report; Whereupon,

The Medical Committee beg leave to Report—

That they have had under consideration an estimate of Hospital Stores, laid before them by the Purveyor by order of the Director of the Hospital: of which estimate, such parts as are approved of by the Committee, and in their opinion necessary to be procured they now lay before Congress, amounting by estimation to 4276 2/3 dollars in specie: Whereupon they offer the following Resolution.

Ordered, That the sum of four thousand two hundred and seventy six dollars and sixty ninetieths of a dollar, in bills emitted pursuant to the resolution of the 18th of March last, be advanced to Thomas Bond, purveyor of the general hospital, to enable him to purchase the stores mentioned in an estimate approved by the Medical Committee; and that the Board of Treasury report a draught or draughts for that purpose.¹¹⁴

November 6, 1780. 1024

Ordered, That a warrant issue on Joseph Borden, commissioner of the continental loan office in the State of New Jersey, in favour of Thomas Bond, purveyor of the general hospital, for four thousand two hundred and seventy six dollars and 60/90, in bills of credit emitted pursuant to the act of Congress of the 18 of March last; for which sum the said Thomas Bond is to be accountable.

November 13, 1780. 1049

A letter, of 5, from Doctor James Tilton was read.

A letter from Doctor James Fallon was laid before Congress;¹¹⁵

Ordered, To lie on the table.

November 17, 1780. 1066

The Board further report,

That they have considered the letter from Doctor William Rickman of the 4th of October last (referred to them by Congress) and are of opinion,

That the medical committee only are competent to determine the expediency of accepting the resignation of Doctor Rickman. No account is open in the public books against Doctor Rickman, but Benjamin Harrison Dep^y Pay Master General in the Southern department has advanced considerable sums of money, for the use of the Hospitals, and

¹¹⁴ This report, in the writing of Abraham Clark, is in the *Papers of the Continental Congress*, No. 22, folio 29.

¹¹⁵ Letter of Fallon, dated November 3, 1780, is in the *Papers of the Continental Congress*, No. 78, IX, folio 347.

that until the said Dep^y Pay Master General renders his accounts, no account with Doctor Rickman can be settled at the Treasury.¹¹⁶

November 24, 1780. 1090-1

The Medical Committee laid before Congress a letter, of 21, from Doctor Shippen, director [general], which was read; Whereupon,

[A motion was made by Mr. Duane, seconded by] Ordered, That Doctor Shippen, director of the hospitals, [be directed to] repair to head quarters and put himself under the orders of the Commander in Chief.¹¹⁷

November 27, 1780. 1095

A letter, of this day, from Doctor Shippen.¹¹⁸

December 4, 1780. 1118

A letter, of 30 November, from B. Binney, hospital surgeon; and

One, of this day, from M. Maus, surgeon of the invalid regiment, were read:¹¹⁹

December 5, 1780. 1120

A letter, of 4, from D(avid) Jackson, hospital surgeon, was read, requesting leave to resign:

Ordered, That leave be granted.

December 6, 1780. 1125-6

The Medical Committee, to whom were referred the letters from Doctor Binney and Doctor Maus, delivered in a report:

The Medical Committee to whom was committed the letters from B. Binney and M. Maus beg leave to report—

That on the 21st day of July last a warrant issue on the Treasury in favor of Dr. Jonathan Potts, Purveyor of the Hospital for 200,000 dollars for procuring Hospital Stores, and paying the Physicians and surgeons in that Department, a part only of which Warrant, owing to a deficiency of money in the Treasury, hath been received—

That on the 6th November last a warrant issued on the Continental Loan Officer of the State of New Jersey in favor of Thomas Bond Jr. the present Purveyor for a certain sum of money for procuring supplies necessary for the hospital, no part of which the Purveyor informs the Committee he hath been able to receive. That on account of the failures in obtaining money, the sick are in a suffering condition; the physicians unable to proceed to their respective charges, and the business of the Department greatly impeded in every part.

That in order to procure supplies immediately wanted for the relief of the sick and to enable the Physicians to perform their duty, it is necessary to

furnish the Purveyor with a sum of money. That it be referred to the Treasury to report a Warrant without delay that will insure a speedy supply.¹²⁰

December 8, 1780. 1128

That a warrant issue on Thomas Smith, commissioner of the continental loan office for the State of Pennsylvania, in favour of Thomas Bond, Junior, purveyor of the hospitals, on the recommendation of the Medical Committee, for fifteen thousand dollars, to be paid out of the proceeds of a bill of exchange for two hundred dollars, part of those heretofore ordered to be drawn on the honorable Benjamin Franklin, minister plenipotentiary of the United States at the Court of Versailles, at ninety days' sight, to be placed in the hands of the commissioner aforesaid, by order of the Board of Treasury, to enable the said purveyor to make provision for some sick soldiers in immediate want in the barracks in this city; for which sum the said Thomas Bond is to be accountable.¹²¹

Ordered, That it be referred to the Board of Treasury, and that they report without delay, a warrant that will ensure a speedy supply of necessities wanted for the sick and enable the physicians to perform their duty.

December 9, 1780. 1132

On motion of Mr. (Theodorick) Bland, a member of the Medical Committee,

Ordered, That the purveyor and apothecary be directed to issue medicines and refreshments necessary for the transient sick which may be, from time to time, under the care of Doctor Maus, as is done in the general hospital, he making returns of such sick in the manner directed in the hospital regulations to the director, and signing receipts for such stores as are issued to him.

Ordered, That Doctor Maus report to the commanding officer at the barracks such officers as are appointed to act under him as surgeon to the transient sick, in case of misdemeanor, in order that they be tried for misconduct or neglect of duty by a garrison court martial.¹²²

December 13, 1780. 1149

A letter, of 6, from Doctor Bloomfield and Doctor Scott, two hospital physicians, was read, enclosing their commissions, and desiring that their resignations be accepted.¹²³

Ordered, That their resignations be accepted.

December 26, 1780. 1194

A letter, of 7, from John Warren was read, signifying his acceptance of the office of hospital physician.

¹¹⁶ This report is in the *Papers of the Continental Congress*, No. 136, IV, folio 713a.

¹¹⁷ This motion, in the writing of James Duane, is in the *Papers of the Continental Congress*, No. 36, IV, folio 499.

¹¹⁸ Shippen's letter is in the *Papers of the Continental Congress*, No. 78, XX, folio 575.

¹¹⁹ Binney's letter is in the *Papers of the Continental Congress*, No. 78, IV, folio 97.

¹²⁰ This report, in the writing of Abraham Clark, is in the *Papers of the Continental Congress*, No. 22, folio 31.

¹²¹ This report is in the *Papers of the Continental Congress*, No. 136, IV, folio 745.

¹²² This motion, in the writing of Theodorick Bland, is in the *Papers of the Continental Congress*, No. 36, IV, folio 435.

¹²³ This letter is in the *Papers of the Continental Congress*, No. 78, IV, folio 53.

EXPENDITURES FOR THE YEAR 1780¹²⁴

Hospital Department. Page 143. 260. 562.	
589. 648. Jonathan Potts, purveyor general, &c. accountable:	376,900
Page 330. Isaac Forster, deputy director general hospitals, eastern department, accountable:	40,000
Page 1128	15,000
And Page 1024, in new emission, 4,276 dollars. Thomas Bond, jun. purveyor general, &c. accountable:	
Total	431,900

STANDING COMMITTEES¹²⁵*Medical*

- 4 May, 1780. James Henry
 7 July, 1780. Abraham Clark in place of Henry
 9 September, 1780. Theodorick Bland in place of Holten
 23 October, 1780. Isaac Motte

January 3, 1781. 15

A letter, of this day, from Doctor William Shippen, director general of the hospital, was read, requesting leave to resign:¹²⁶

Ordered, That his resignation be accepted.

Two papers, signed Patrick Garvey, were laid before Congress and read:

Ordered, That the same be referred to the Medical Committee.

January 4, 1781. 20

. A letter, of November 29, from Doctor Forster to the Medical Committee, were read:¹²⁷

January 11, 1781. 47-8

Resolved, That Monday next be assigned for electing a director [general] of the hospital, and a paymaster general to the army.

Doctor J. Cochran was nominated by Mr. (James Mitchell) Varnum for the office of director [general]; Doctor Brown, by Mr. (Joseph) Montgomery; Dr. Craig, by Mr. (Abraham) Clark.

January 13, 1781. 56

Doctor J. Morgan was nominated by Mr. (George) Walton, for the office of director of the hospitals.

January 17, 1781. 65, 68

Congress proceeded to the election of a director of the military hospital; and the ballots being taken, Dr. John Cochran was elected, having been previously nominated by Mr. (James Mitchell) Varnum.

Congress took into consideration the report of

¹²⁴ This Appendix appears only in the first edition of the Journals, Vol. VI. (Claypoole imprint: See Bibliographical Notes No. 353.) The paging has been altered to correspond with the pages of the present edition.

¹²⁵ See pages 1445-1447 of Vol. XV. I now give such appointments only as were made in 1780.

¹²⁶ This letter is in the *Papers of the Continental Congress*, No. 78, XXI, folio 1.

¹²⁷ Forster's letter is in the *Papers of the Continental Congress*, No. 78, IX, folio 491.

the committee on the letter of 5 of November last, from General Washington, enclosing a memorial from the officers in the hospital department; and, thereupon, came to the following resolutions:

Whereas, by the plan for conducting the hospital department, passed in Congress the 30th day of September last, no proper establishment is provided for the officers of the medical staff, after their dismissal from public service, which, considering the custom of other nations and the late provision made for the officers of the army, after the conclusion of the war, they appear to have a just claim to; for remedy whereof, and also for amending several parts of the above mentioned plan:

Resolved, That all officers in the hospital department, and medical staff, hereinafter mentioned, who shall continue in service to the end of the war, or be reduced before that time as supernumeraries, shall be entitled to, and receive, during life, in lieu of half-pay, the following allowance, viz.

The director of the hospital equal to the half-pay of a lieutenant colonel:

Chief physicians and surgeons of the army and hospitals, [each equal to the half-pay of major] and hospital physicians and surgeons, purveyor, apothecary, and regimental surgeons, each equal to the half-pay of a [lieutenant] captain: [and regimental mates each equal to the half-pay of a] lieutenant.

That there be allowed to the purveyor, apothecary, and assistant purveyors, each, forage for one horse:

That the power given in the before-mentioned plan, to the chief physician and surgeon of the army, to remove regimental surgeons and mates in case of absence without leave, shall in future extend no further than a power of suspension, until such delinquent shall be reported to a proper officer for bringing him to trial by court martial:

That the apothecary may deliver medicines, instruments and dressings, and other articles of his department, to the hospitals, on orders in writing from a physician and surgeon having the care of any particular hospital, where the director or one of the chief physicians and surgeons shall not be present to give the same:

That the power given to the director and chief hospital physicians, with respect to the appointment of matrons, nurses, and other persons necessary for the regular management of the hospitals, be extended to each of the physicians and surgeons of the hospitals, in the absence of the director and chief physicians and surgeons.

[That notwithstanding the prohibition against officers of the hospitals using any of the Stores provided for the sick, the said officers may occasionally draw out of the hospital Stores under their particular direction by written orders on the Stewards of the same, such small articles for their comfortable subsistence as they may stand in need of, Negated provided such articles are not immediately wanted for the use of the sick: of which articles so issued, the Stewards shall keep regular accounts, charging each officer with the articles drawn at the current price the same bears at that time, which shall be deducted out of his pay in the settlement of his account, copies of which accounts, each

respective Steward, under obligation of his oath of Office, shall transmit every six months to the Purveyor, Which being charged in a general account by him, shall be lodged in the Treasury Office—

That the Director, Chief Physicians of the army and hospitals, and other Physicians and officers in the hospital department, as well those lately dismissed from service, as those re-appointed in the last arrangement who were in office between the first day of Sept. 1777, and the 30th day of September last, shall have the depreciation of money made good to them on their pay for such part of the above mentioned time as they were actually employed in public service.¹²⁹

January 25, 1781. 86

A letter, from Doctor Gould, was read:

Ordered, That it be referred to the Medical Committee.

February 1, 1781. 103-4

A letter, of 31 January, from Doctor Gould, was read:¹³⁰

On motion of the medical committee,

Resolved, That the purveyor of the hospital be, and hereby is empowered and directed to collect, or cause to be collected and secured under care, until properly issued, all public hospital stores and medicines in Virginia, late under the direction of Dr. Rickman, or others acting under the United States, and all persons in possession of such public stores or medicines, are hereby required to deliver the same to the said purveyor, or his order, upon demand.

[That the medical committee be authorised during the absence of the director to direct a number of the hospital physicians and mates to repair immediately to Virginia and take the charge of the hospitals in that state.]¹³⁰

A motion was made by Mr. (Theodorick) Bland, seconded by (Mr. George) Walton, respecting the hospitals for the southern army:

Ordered, That it be referred to the Medical Committee.

February 5, 1781. 115

A letter, of 3, from Doctor B. Binney, was read:¹³¹

February 6, 1781. 118

On motion of Mr. (Theodorick) Bland,

Resolved, That Thomas Bond, jun. purveyor to the general hospital, be, and hereby is, authorised to settle the accounts for salaries, and pay the officers of the hospital established in Virginia, under the direction of Dr. Gould, which have accrued since the new arrangement of the medical department; and that Dr. William Rickman, late deputy director, settle and return the accounts of salaries due the officers of the said hospital, prior to that date, to the present purveyor.

¹²⁹ This report, in the writing of Abraham Clark, is in the *Papers of the Continental Congress*, No. 19, VI, folio 331.

¹³⁰ This letter is in the *Papers of the Continental Congress*, No. 78, X, folio 285.

¹³¹ This motion, in the writing of Abraham Clark, is in the *Papers of the Continental Congress*, No. 36, I, folio 121.

¹³² Binney's letter is in the *Papers of the Continental Congress*, No. 78, IV, folio 93.

February 8, 1781. 130

A letter, of 7, from B. Otto, physician and surgeon, was read; Whereupon,

Ordered, That the letter of Doctor Otto be referred to the Board of War to take measures for preventing any interruption being given to the hospital at the yellow springs, the same being provided solely for the reception of proper hospital subjects.

February 16, 1781. 155

The Medical Committee laid before Congress a letter, of January 12, from Doctor J. Browne, acting as surgeon general in the southern army, which was read:

Ordered, That it be referred to the Medical Committee.

Ordered, That Mr. (William) Burnett be added to the Medical Committee.

February 19, 1781. 160

A letter, of 3, from J. Cochran, was read, signifying his acceptance of the office of director general of the hospital.¹³²

A memorial of John Bartlet was read:¹³³

Ordered, That it be referred to the Medical Committee.

February 22, 1781. 187

A letter, from Doctor B. Binney, was read:¹³⁴

Ordered, That it be referred to a committee of three.

February 24, 1781. 191

On motion of the Medical Committee:

Ordered, That a warrant issue on Thomas Smith, commissioner of the continental loan office for the State of Pennsylvania, in favour of Doctor Thomas Bond, purveyor of the hospital, for forty thousand dollars of the old emissions, to be applied towards paying the officers of the medical department in part of their salaries due since their appointment under the present arrangement, for which sum the said purveyor to be accountable.

February 27, 1781. 199

A letter, of 10, from James Craig, chief hospital physician, was read:

Ordered, That it be referred to the Medical Committee.

March 3, 1781. 230

The report of the committee on the letter of the 28th February from Dr. W. Burnet, was taken into consideration; Whereupon,

Ordered, That Dr. James Craik, chief hospital physician and surgeon, be, and he is hereby appointed chief physician and surgeon of the army, in the room of Dr. J. Cochran, elected director of the hospital; and that Monday next be assigned for electing a chief hospital physician and surgeon, in the room of Dr. Craik, removed to the army.¹³⁵

¹³² This letter is in the *Papers of the Continental Congress*, No. 78, VI, folio 11.

¹³³ Bartlett's memorial is in No. 19, I, folio 241.

¹³⁴ This letter, dated February 20, 1781, is in the *Papers of the Continental Congress*, No. 78, IV, folio 89.

¹³⁵ This report, in the writing of Abraham Clark, is in the *Papers of the Continental Congress*, No. 19, I, folio 473.

March 5, 1781. 233

According to the order of the day, Congress proceeded to the election of a chief physician and surgeon of the hospital, in the room of Dr. Craik, removed to the army; and, the ballots being taken, Dr. William Burnet was elected, having been previously nominated by Mr. (John) Witherspoon.

March 7, 1781. 237

A memorial of Francis Hagan, a physician and surgeon in the hospital, was read;¹³⁶

March 14, 1781. 259

The committee on Doctor B. Binney's letter, of 20 February:

The Committee to whom was referred the letter of Doctor B. Binney on the 22d Feby. report, That Doctor Binney's services are useful and necessary in the medical department, and that he ought to be retained in that department,

That it is the opinion of the Committee Doctor Binney should immediately repair to the State of Virginia, according to the order he hath received from the Director General of the hospitals; and that an order issue to the Treasury to furnish on account the sum of forty thousand dollars of the old emissions of Congress, to enable him to bear the expences of himself and two Mates, and to establish and furnish hospitals in the said State.¹³⁷

March 16, 1781. 273

The Medical Committee also delivered in a report for arranging the hospital for the southern army.

The Medical Committee, to whom was referred the memorial of Doctor J. Bartlett: delivered in their several reports.

March 19, 1781. 275-7

The report of the Medical Committee on the memorial of Dr. John Bartlett, late physician and surgeon general of the army in the northern department, was taken into consideration; and it appearing,

The medical committee to whom was referred the memorial of Dr. John Bartlett late Physicⁿ and Surgⁿ Gen^l of the army in the northern department, beg leave to lay before Congress the following State of Facts respecting the memorialist.

That on the 11th of April 1777 he was appointed Physicⁿ and Surgⁿ Gen^l to the army in the northern department, to which he repaired some time in July following and with which he continued until the 23d of October following when he was permitted by Gen^l Gates to return home on account of his inability to perform the duties of the office by reason of the infirmities of age and more especially on account of an accidental injury received in his arm, That it appears to your committee that at the time Dr. Bartlett left the army it was generally understood that he had no design of returning to that post, he

having before he received the hurt in his arm declared repeatedly to the other officers of that department that he was too old and infirm to perform the duties belonging to that office and at his particular request exchanged with Dr. Thomas Tillotson an Hospital Surgeon, That before he went home he obtained a certificate from Dr. Potts and Dr. Treat recommending him for an appointment to any hospital that might be established near his own home. That this notwithstanding, he repaired to the army at the White Plains some time in the year 1778, but was not considered or treated as Physician and Surgeon General nor did he do any of the duties of that office, Dr. Tillotson having been appointed by Gen^l Gates in his room and being then with the army and doing the duties of that office.

That on the first of July 1779 Dr. Shippen the late Director General at the particular request of Dr. Bartlett's friends directed him to repair to Fish Kill and superintend the Hospital at that place, where he accordingly came and the officers of that Hospital refusing to do duty under him he requested and obtained permission from Dr. Shippen on the 28th September 1779 to return home,

That he received pay for the time he was with the northern army in 1777 and six months pay besides after he went home and also that he received three months pay for the time he was at Fish Kill in 1779. Since which time your Committee cannot find that Dr. Bartlett hath either done duty or received pay. Upon which State of facts your Committee beg leave to report,

That Dr. John Bartlett, at his own request, and with the consent of the commanding officer of the department, and the deputy director and other officers thereunto belonging, left the service to which he was appointed, in a manner which clearly indicated his intention of relinquishing his office; and having received pay for all the time he spent with the army, and six months while he was at home, cannot be entitled to any farther pay or allowance.¹³⁸

March 22, 1781. 292-4

A letter, of January 14, from Major General Greene, was read, with sundry papers enclosed:

Ordered, That it be referred to the Medical Committee.

The report of the Medical Committee, delivered the 15, was taken into consideration, and it was thereupon resolved as follows:

Whereas the late regulations for conducting the medical department and military hospitals passed the 30th day of September last, and amended by several subsequent acts of Congress, extends no farther southward than to include the State of Virginia; and whereas the present operations of the war to the southward, make it necessary that the hospital department, in that district, be rendered as uniform to that in the northern army as circumstances will permit, that no inconveniences may arise to the army in general from different and opposite systems, as its operations may eventually be interchangeable from one district to another in a short space of time; therefore,

¹³⁶ Hagan's memorial is in the *Papers of the Continental Congress*, No. 41, IV, folio 173.

¹³⁷ This report, in the writing of Meriwether Smith, is in the *Papers of the Continental Congress*, No. 19, I, folio 361. It is indorsed: "Aug. 24, 1781, not to be acted upon."

¹³⁸ This report, in the writing of William Burnet, is in the *Papers of the Continental Congress*, No. 19, I, folio 229.

Resolved, That there be one deputy director of the military hospitals, [in the Southern district subject to the general control of the director] who shall, in the absence of the director, have the general control and management of all the military hospitals that are or may be established [to the Southward of Virginia] under the orders of the commander of the southern army for the time being.

When the foregoing resolution was under debate, a motion was made by Mr. (John) Mathews, seconded by Mr. (Thomas) Bee, after the words "the director," to insert "for the southern army;" and on the question, shall those words be inserted? the yeas and nays being required by Mr. (Thomas) Bee,

So it passed in the negative.

Resolved, That [within the] for the army aforesaid, [district] there shall be one chief physician of the hospital, who shall also be a surgeon; one chief physician to the said army, who shall also be a surgeon; two hospital physicians, who shall also be surgeons; and four surgeons' mates for the hospitals; one deputy purveyor with an assistant, one deputy apothecary with an assistant; and to each hospital, a steward, matron, orderly men and nurses as is directed in the arrangement of the [northern] hospital, passed the 30 day of September aforesaid.

That the deputy director, deputy purveyor and deputy apothecary, have and exercise the same powers which are exercised by the director, purveyor and apothecary respectively, agreeably to the arrangement above-mentioned:

That the pay of the deputy director be one hundred and forty dollars per month, that of the deputy purveyor and deputy apothecary, each one hundred and twenty dollars per month; and they shall severally be entitled to the same emoluments, and subject to the same regulations and restrictions as their respective principals are entitled or subjected to by the above-mentioned arrangement and the amendments thereto:

That all the other officers of the hospital and medical staff for the southern [district] army, exercise the same powers, perform the same duties, receive the same pay and emoluments, and be subject to the regulations and restrictions laid down in the aforesaid arrangement for officers of like description:

Provided nevertheless, that the powers therein directed to be exercised by the director, and any two chief physicians and surgeons of the hospital, shall, in the absence of the deputy director, be vested in and exercised by the next officer in the hospital department for the southern army, and so on in succession, in conjunction with the two next seniors.¹⁴⁰

March 27, 1781. 316

The United States in Congress assembled proceeded to the election of a deputy purveyor of the hospital for the southern army, and, the ballots being taken and counted, Dr. Nathan Brownson was elected, he having been previously nominated by Mr. (Samuel) Adams.

¹⁴⁰ This report, in the writing of Theodorick Bland, is in the *Papers of the Continental Congress*, No. 22, folio 33.

April 12, 1781. 375

On motion of the Medical Committee:

Ordered, That a warrant issue on Thomas Smith, commissioner of the continental loan office for the State of Pennsylvania, in favour of Thomas Bond, jun^r, purveyor of the hospital, for thirty thousand dollars of the old emissions, twenty thousand dollars of which to be delivered to Nathan Brownson, deputy purveyor, to be applied to the use of the hospitals established for the southern army and the remaining ten thousand to be applied by the purveyor towards the paying persons necessarily employed in the general hospital northward of Virginia, for which sum of thirty thousand dollars the purveyor to be accountable.¹⁴⁰

April 13, 1781. 388

On motion of the Medical Committee:

Ordered, That a warrant issue on John Hopkins, commissioner of the continental loan office for the State of Virginia, in favor of Thomas Bond, Jun^r, purveyor of the hospital, for five thousand dollars of the new emission, to be by him put into the hands of Nathan Brownson, deputy purveyor, to pay three months' salary and wages due to the officers and others employed in the hospital established for the southern army and to procure supplies for said hospital, for which sum the said purveyor is to be accountable.

April 30, 1781. 464

A memorial of sundry officers late of the hospital staff was read:¹⁴¹

Ordered, That it be referred to a committee of three:

The members, Mr. (James) Duane, Mr. (William Churchill) Houston, Mr. (Isaac) Motte.

May 2, 1781. 467

Treasury Office, May 1st, 1781

The Board of Treasury upon the petition of Lieutenant Andrew Lee of Col. Hazen's regiment referred to them 27th ultimo, beg leave to report to the United States in Congress Assembled, That for the payment of the said Lt. Lee's account (inclosed in the said petition) of expences incurred, from the time he was wounded at Springfield New Jersey in June 1780 to the 3rd of January 1781 to the amount of 3820 dollars old emissions, a warrant issue on Thomas Smith Esq. Commissioner of the Continental Loan Office for the State of Pennsylvania in favour of Dr. Thomas Bond purveyor of the General Hospital for 3820 dollars of the old emissions to enable him to pay the account of the said lieut^e. Lee, for which sum the said Dr. Thos. Bond is to be accountable.¹⁴²

Ordered, That a warrant issue on Thomas Smith, commissioner aforesaid, in favour of Thomas Bond, purveyor of the general hospital, for fifty dollars and eighty-four ninetieths of a dollar of the new emis-

¹⁴⁰ This report, in the writing of Abraham Clark, is in the *Papers of the Continental Congress*, No. 22, folio 37.

¹⁴¹ This memorial, dated April 22, 1781, is in the *Papers of the Continental Congress*, No. 41, VII, folio 292.

¹⁴² This report is in the *Papers of the Continental Congress*, No. 136, V, folio 289.

sion, to enable him to discharge the account of Lieutenant Lee for expences incurred from the time he was wounded at Springfield, New Jersey, in June, 1780, to the 3 January, 1781, for which sum the said Thomas Bond, purveyor, is to be accountable.

May 4, 1781. 475

Ordered, That Mr. (John) Witherspoon be added to the committee on the memorial of sundry officers late of the hospital staff;

May 23, 1781. 529

The report from the Medical Committee was read; Whereupon,

The Medical Committee report,

That the Purveyor has certified to them that there is due to Dr. Peter Fayssoux for his pay as Physician and Surgeon General of the Hospitals in the Southern Department, a balance of 2599 dollars therefore submit the following resolve:

Ordered, That a warrant issue in favour of Thomas Bond, purveyor of the hospitals, for one thousand dollars of the new emission to be by him paid to Doctor Peter Fayssoux in part of his arrearages of pay, to enable the said Doctor P. Fayssoux to repair to the southern army [to take charge of the hospital].¹⁴³

May 25, 1781. 534

That so much of the letter, of 25, from J. Cochran, director general, as respects the hospital surgeons, stores and farther appointments, be referred to the Medical Committee;

That such parts of the same as respects depreciation and the pay of surgeons be referred to the Board of War; and

That such parts of the same as respects the postage of letters to and from surgeons be referred to the committee on the Post Office;

That the resignation of Doctor Hagan be accepted;¹⁴⁴

May 25, 1781. 541

Resolved, That Dr. James McHenry receive the commission of major in the army of the United States, to take rank from the 30th of October last:

May 26, 1781. 544

The Medical Committee; delivered in their respective reports.

The Medical Committee report that from a Certified account of Joseph Eaker, Surgeon's Mate, under the hands of Doctor William Shippen, late Director General and Thomas Bond Purveyor, and a letter from the said Joseph Eaker, referred to them, it appears to your Committee that the said Eaker has been lately released from captivity where he had remained for seven months, that he is in much distress, and that there is due to him the said Eaker on account of pay and rations £444- 13s- 3d —Your Committee therefore report, that a warrant issue in favour of D^r Tho^s Bond, Purveyor of General Hospital for a sum equal to £444- 13s- 3d to be

paid to Joseph Eaker late Surgeons Mate to the Hospital on discharge of the pay and rations due the said Eaker as appears by the aforesaid Certified acct.¹⁴⁵

May 28, 1781. 570

Ordered, That the Medical Committee be discontinued, and that the Committee lodge with the Board of War all the returns and papers in their possession, and then be discharged; and that the business heretofore entrusted to them, and the powers with which they were invested, be transferred to the Board.

July 11, 1781. 624-5

A report from the Board of War, on the letter from the director (of the hospitals, was read; Whereupon,

Ordered, That the sum of eight thousand five hundred and forty five dollars and one-third of a dollar in specie or [Bills of the new Emissions] other money equivalent, be immediately put into the hands of the purveyor of the military hospitals in part of the estimate laid before Congress by the medical committee, to enable him to purchase an immediate supply for the use of the sick, and to prepare for the immediate exigencies of the campaign in the hospital department:

That the sum of sixteen thousand one hundred and sixteen dollars, in specie or [Bills of the new Emissions] other money equivalent, be advanced to the said purveyor, for three months' pay, to be paid by him on account to the officers of the medical department:

That a warrant be drawn on the treasurer of the State of New York, for six thousand dollars, and another warrant on the treasurer of Virginia for four thousand dollars, in specie or [Bills of the new Emissions] other money equivalent, in part of the above sum of sixteen thousand one hundred and sixteen dollars, in favour of the said purveyor or his order; and that the residue, viz. six thousand one hundred and sixteen dollars be paid him at Philadelphia, in specie or [Bills of the new Emissions] other money equivalent:

That four thousand two hundred dollars, in specie or [Bills of the new Emissions] other money equivalent, be paid to the said purveyor, to be put into the hands of stewards at established hospitals, to purchase milk and vegetables and discharge small incidental charges at fixed hospitals).¹⁴⁶

That the Treasury Board be and they are hereby Postp^d directed to devise ways and means for supplying the foregoing sums of eight thousand five hundred and forty five and one third, six thousand one hundred and sixteen, and four thousand two hundred dollars.

That all vacancies of regimental Surgeons and Mates in any regiments of the several State Lines be filled up by the respective States in whose Lines the vacancies shall happen in the same manner with vacancies happening in the Line of the State.

That all vacancies of regimental Surgeons and

¹⁴³ This report, in the writing of Theodorick Bland, is in the *Papers of the Continental Congress*, No. 19, II, folio 267.

¹⁴⁴ Copies of extracts from Cochran's letter are in the *Papers of the Continental Congress*, No. 78, VI, folios 33-35.

¹⁴⁵ This report, in the writing of Theodorick Bland, is in the *Papers of the Continental Congress*, No. 19, II, folio 191.

¹⁴⁶ The portion in parentheses was entered in the Journal by George Bond.

Mates happening in regiments or Corps not belonging to the Line of any State be filled up by the Director or Deputy Director of the Hospitals with the Army in which such regiments or Corps shall serve the said Director or Deputy Director reporting the same to the Commander in Chief or commanding General of a separate Army that information thereof may be given to the Board of War who shall fill up Commissions accordingly.

The filling up the vacancies in the Medical Department we leave to the wisdom of Congress with this observation that the Director represents to us that this measure is necessary.¹⁴⁷

June 18, 1781. 668

Ordered, That the Board of War report a plan of succession to vacancies in the hospital and medical lines of the army.

June 22, 1781. 690

The Committee of the Week report,
That the memorial of G. Glentworth, W^m Smith and James Fallon, supernumerary senior physicians and surgeons of the general hospital for themselves and in behalf of other supernumeraries praying "That Congress will please to grant them, in common with supernumerary judges advocate, regimental surgeons and chaplains, their depreciation and half pay" ought to be referred to a special Committee.¹⁴⁸

July 3, 1781. 718

The committee of the week made report; Whereupon,

Ordered, That a letter of this day from Doctor James Tilton be referred to the Board of Treasury to take order thereon to settle depreciation and grant a certificate as prayed; ¹⁴⁹

July 17, 1781. 756

A report from the Board of War was read; Whereupon,

Resolved, That the Board of War be authorised to draw on the paymaster general in favour of Captain Patrick Carns of Lieutenant Colonel Lee's legion, for two hundred and ten dollars in bills of the new emission; ¹⁵⁰ and of Doctor Morris, surgeon of Colonel Armand's legion, for two hundred and twenty-five dollars in bills aforesaid in part of their pay, and for which sums they are respectively to be accountable.¹⁵¹

July 24, 1781. 785

A report from the Board of War was read; Whereupon,

War Office, July 24, 1781

Sir,

Robert Henry, Surgeon of the 2nd New Hamp-

¹⁴⁷ This report is in the *Papers of the Continental Congress*, No. 147, V, folio 273. It is indorsed "August 23, 1781, not to be acted upon."

¹⁴⁸ This report, in the writing of Thomas Rodney, is in the *Papers of the Continental Congress*, No. 32, folio 177.

¹⁴⁹ This report, in the writing of Samuel Livermore, is in the *Papers of the Continental Congress*, No. 32, folio 185.

¹⁵⁰ This clause is in the *Papers of the Continental Congress*, No. 148, II, folio 49.

¹⁵¹ This clause is in the *Papers of the Continental Congress*, No. 148, II, folio 55.

shire Regiment hath represented to the Board, that he was taken prisoner by the enemy (at the time Col. Greene was killed) and stripped of all his clothing. He hath since obtained his parole, for a limited time to procure some necessaries. He further represents that he hath received but two months' pay in twenty, that before he belonged to this regiment he was mate in the General Hospital, and there appears due to him by Doctor Bond's certificate for that service £101.5. specie, which sum there is no provision made to pay, and he further saith, that he is at this time destitute of cash. Upon considering the foregoing representation, the Board submit the following resolution:

Ordered, That the Board of War draw on the paymaster general in favour of Robert Henry, surgeon of the second New Hampshire regiment for one hundred and ninety-five dollars of the new emissions on account of his pay; ¹⁵² and

September 20, 1781. 979-81

The report of the Board of War respecting the hospital department was taken into consideration; and Thereupon,

At a Board of War September 17th, 1781.

Present Mr. Peters

Mr. Cornell

The Board do themselves the honor to report to Congress on the medical department, and beg leave to observe that they have taken every measure in their power to procure the necessary information to enable them to do justice to the United States as well as individuals.

First. For settling the line of promotions in the medical staff they have obtained a plan fixed by a Board of General Officers under the orders of the Commander in Chief with his approbation. Copies of which No. 1 and 2 are enclosed, the plan they beg leave to recommend to be established by Congress as reported by the General Officers for a rule of promotion in the medical staff in future.

Secondly. In consequence of General Greene's Request for assistance in the Medical Department, they have consulted the Commander in Chief on the propriety of filling up the vacancies under the Director General and requesting him to send the necessary assistance to the Southern Army. He was not able to determine the question, but on his arrival at the head of Elk he obtained Dr. Craik's opinion on that subject which is contained in the enclosed paper No. 3, but as it appears from the tenor of Dr. Cochran's letter to the Board (an extract of which is enclosed in No. 4) that he entertains different sentiments, the Board take the liberty to recommend to Congress that appointments be made agreeable to Dr. Cochran's recommendation contained in the enclosed paper No. 5 to serve with the main army and its dependencies. And those contained in Doctor Oliphant's recommendation contained in the enclosed paper No. 6, to be appointed for the Southern Army under the Command of General Greene.

The Board are the more induced to recommend the appointment of those Gentlemen to the Southward as it appears to them absolutely necessary

¹⁵² This report is in the *Papers of the Continental Congress*, No. 148, II, folio 85.

they should be with the army immediately and could they possibly be spared from their quarter a considerable sum of money must be advanced to defray their travelling Expences which it is to be feared would cause a considerable delay.¹⁵³

Resolved, That the present vacancies of hospital physicians and surgeons be filled up by the senior surgeons of the hospital lately deranged, the eldest hospital mates or regimental surgeons, as shall be recommended by the director and chief physician and surgeon to the army:

That all future vacancies of hospital physicians and surgeons be filled by the eldest regimental surgeons and hospital mates, who shall be reckoned of equal grades, who shall upon examination be found qualified and obtain a certificate of recommendation from the director and chief physician and surgeon of the army, or of the deputy-director and chief physician in a separate department:

That the persons requisite to fill the higher grades in the hospital and medical departments, be appointed, from time to time, by Congress, according to merit and abilities:

[That the states shall nominate regimental surgeons to the regiments of their respective lines, who shall be examined by the director and chief physician and surgeon to the army and one of the chief hospital physician or of the deputy director and of the chief Physician in a separate department, and upon their certificates of approbation shall receive the appointment.]

That all surgeons to regiments or corps not belonging to the line of any particular State, be nominated by the director of the hospitals, and the chief physician and surgeon of the army, subject to the approbation of the Commander in Chief, and shall be equally entitled to promotion to hospital physicians and surgeons with the regimental surgeons of states lines.¹⁵⁴

On recommendation of the director approved by the Board of War:

Resolved, That Dr. Joseph Young, a deranged senior surgeon, and doctors Goodwin Wilson, Daniel Jenifer, Samuel Edmondson and George Campbell, eldest surgeon's-mates, be promoted to the rank of hospital physicians and surgeons, to fill the vacancies occasioned by the resignations of doctors Bloomfield, Scott, Hagan and Jackson, and the promotion of Dr. Burnet.

On the recommendation of the deputy director, approved by the Board of War:

Resolved, That doctors Thomas Tudor Tucker, and Vickars, be appointed physicians and surgeons in the hospital for the southern department:

That Daniel Smith be appointed assistant deputy purveyor, and John Carns assistant deputy apothecary, in the southern department.¹⁵⁵

¹⁵³ This report is in the *Papers of the Continental Congress*, No. 148, II, folio 259.

¹⁵⁴ A copy of this report of the Board of General Officers, referred to, in the Board of War report, as No. 2, is in the *Papers of the Continental Congress*, No. 148, II, folio 269.

¹⁵⁵ A copy of the recommendation of the director (John Cochran) dated June 4, 1781, is in the *Papers of the Continental Congress*, No. 148, II, folio 273; a copy of the recommendation of the deputy director (David Olyphant) is on folio 263.

October 16, 1781. 1055

Ordered, That Thursday next be assigned for electing a deputy purveyor for the military hospital, in the room of Doct Brownson, who is elected governor of Georgia.

October 25, 1781. 1072

A report from the committee of the week was read; Whereupon,

The Committee of the week report,

That a letter of Robt. Johnson Deputy Purveyor of the Southern Department requesting relief for the Gentlemen of his Department; the Petition of Capt. Joseph Traversier praying for the pay and subsistence due to him; the letter of R. G. Livingston praying for so much pay as will enable him to join his Reg^t; the Petition of Thomas Bond and others officers of the medical Department; the Petition of John Dealy praying for a discharge from the army; the Letter from Doctor Halling requesting the pay due to him, and to know whether he is considered as retiring from the service; be referred to the Board of War.

November 3, 1781. 1092, 3-8

A memorial and petition of Barn: Binney was read.¹⁵⁶

The committee to whom the letters from the superintendent of finance relative to the hospital department; and

The committee to whom the letters from the Superintendent of Finance relating to the Hospital Department was referred do report that they have fully considered the present state of the Hospital or Medical Department in the Army, and the several papers referred to them, and having taken the best advice and information in their power are of opinion that great economical advantages to the public and very useful alterations to the sick and wounded, may be obtained by a regulation of the said Department in the following principles.

By destroying all distinctions between Hospitals and forming the whole Medical Department into one uniform Corps.

By establishing the direction of practice and Purveyorship entirely distinct and separate vesting it in different hands.

By establishing the Superintendence of the Department in a Board of Surgeons, properly organized for that purpose and not in a single person.

By the promoting the use of regimental Hospitals, and preventing the crowding the sick together in General Hospitals.

By preventing every person concerned in Hospitals from trading and speculating in any manner whatever for private advantage and emolument.

By reducing the number of Surgeons and Mates of the General Hospitals.

Under the influence of these principles your Committee beg leave to Report the following Ordinance for constituting and arranging the Hospital Department.

An Ordinance for regulating the General Hospital, and Surgeons of the Army.

¹⁵⁶ This memorial and petition, dated November 3, 1781, is in the *Papers of the Continental Congress*, No. 41, I, folio 375.

Be it ordained by the United States in Congress Assembled, That there shall be one Physician in Chief to the Army and Director of the Military Hospitals: [Thirteen] Twelve Surgeons and twenty [six] four Mates, for the General Hospital, a Surgeon and one Mate to every regiment; an Apothecary and two Assistants; and a Purveyor and one assistant.

The Physician in Chief and the hospital Surgeons or any three of such Surgeons shall make a Medical Board, of which a field Officer to be appointed in the usual form shall sit as President; it shall meet regularly once a month, by General order, or often-er if requisite. They shall examine regimental and examine and appoint all hospital Mates; and shall examine and recommend the [regimental and] hospital Surgeons, [and none but those recommended by the Board shall be appointed by Congress to vacancies,] and no person under the age of 21 years shall be appointed a Mate: It shall be the special duty of the said Board from time to time, to settle the proportions of regimental and hospital practice, and to make regulations accordingly. They shall prescribe the measures for supplying the sick effectually with medicines, stores, provisions &c. It shall also be their duty to make out proper estimates for the Purveyor, inspect his accounts and transactions, and regulate his plan of issues so as to prevent waste and extravagance. As often as required, the Director shall report to the Board a full state of all the Hospitals under his direction, and receive their Instructions. This Board shall enquire into all complaints brought against Officers of the Department: and present to a Court Martial, such as they may think deserving of censure. And this Board shall be authorized to digest rules and carry into execution, every thing relative to the Medical Department: Provided nevertheless, that no regulation of theirs be valid and take effect until issued in orders, with the consent and approbation of the Commander in Chief or the Commanding Officer of a separate Department.

The Physician in Chief and Director shall have a general Superintendency and direction of practice, both in Camp and in hospitals. He shall always maintain an office near Head Quarters, so as to be ready, at all times, to consult and advise with the Commander in Chief; and to distribute the necessary advice and direction to the Surgeons with whom it shall be his duty to correspond. With the concurrence of the Commander in Chief he may establish such Hospitals as service requires: and he shall dispose of the officers necessary to conduct them. In time of engagement or any emergency, he shall call into the field as many hospital Surgeons as the occasion requires; and by order of the General, may have assistance in hospitals, from the regimental Surgeons.

It shall also be the special duty of the Director, frequently to inspect all the hospitals under his direction; to see that they are managed with economy and success: to correct all abuses; to suspend and bring to trial, delinquent Officers: and to make monthly returns of the sick to the Commander.

In the absence of the Director from Camp, the Surgeon eldest in appointment, who is present, shall do his duty.

Every Surgeon shall direct his own hospital agreeable to the regulations, from time to time adopted by Congress or the Medical Board, and communicated to him by the Director. He is hereby authorized to order from the Purveyor or his Assistant, or from the Commissaries and Quarter Masters of the Army, or to be purchased from the neighborhood, whatever is necessary and convenient for the sick: and shall be accountable for his conduct and success in practice, to the director; but shall not be dismissed the service without due form of trial.

When two or more Surgeons are on duty in one hospital, each shall act independently with respect to all matters relating to his own particular charge, and shall be accountable to the director only, or the Surgeon presiding in his stead. In case of dispute, with regard to any matter respecting the whole hospital, the Surgeon of senior appointment shall control, until the matter in dispute can be decided by the Director, or in his absence, the presiding Surgeon.

The regimental Surgeon shall give diligent attention to such regulations as may be established respecting their conduct, and shall manage the sick of their respective regiments accordingly; and shall also be accountable to the Physician in Chief as the common head of the Medical Department.

The Hospital and regimental Mates shall observe the director of the Surgeons, and shall diligently perform all the reasonable duties required of them, for the recovery of the sick. They shall also make out returns of the sick, for the Surgeons respectively, agreeable to such forms as the director shall require.

The Apothecary and his Assistants shall receive, prepare and deliver Medicines, Instruments and dressings, and other articles of his department, to the hospitals and Army, on orders, in writing, from the director or Surgeons. He shall appoint a proper number of Mates to assist him in his duty, and shall furnish one to every Hospital, where one is required by the Director.

All the Instruments delivered by whose order soever obtained, shall be paid for, at prime cost, by the Surgeon or Mate receiving them.

The Purveyor shall provide all necessary medicines, utensils and stores of every kind, that may be ordered by the Medical Board, for the delivery of which a written order from the Director of a hospital Surgeon shall be his voucher. It shall also be his duty to pay all the Officers of the Hospital and every debt and expence of the sick after being duly certified. For these purposes he shall draw money from the Treasury agreeable to the estimates given him by the Medical Board. He shall settle his accounts of expenditure in money every three months, with the Auditors of accounts, and once a month, he shall lay a state of the expenditure of stores with the stock on hand, before the Medical Board.

The Purveyor shall direct the conduct of his Assistant, and by advice and order of the Medical Board shall appoint such other Assistants, Storekeepers and Clerks as the service may require.

In every hospital the purveyor or his Assistant shall appoint a steward: whose duty it shall be to purchase vegetables, straw and other small articles, to

receive the stores and provisions for the use of the hospital and deliver them agreeable to the orders of the prescribing Surgeons. And although in his purchases and Issues he is to obey the orders of the prescribing Surgeons: yet for the faithful discharge of his Office, he is to be accountable to the Purveyor, and for this purpose he shall keep separate accounts of all he receives from the Purveyors, Quarter Masters and Commissaries, and of what he purchases himself from the country; and shall render an account of all his Issues monthly, with his stock on hand, to the Purveyor; thus to enable the Purveyor to lay the whole monthly expence of the hospital, before the Medical Board. The Steward's vouchers shall express not only by whom ordered, but by whom received also. The Steward shall also receive the spare regimental arms, accoutrements and cloathing of each soldier admitted into the Hospital keeping entries of and giving receipts for every Article received, which when the soldier shall be discharged, shall be accounted for by the said Steward, with the Commanding Officer of the regiment to which such soldier belonged, or other proper person, and shall also take charge of the hospital cloathing. In every Hospital, the director or Senior Surgeon present, shall appoint a Matron and a proper number of nurses to be under the direction of the prescribing Surgeons, and paid by the Purveyor.

During the summer, when the Army is in the field, the Director shall institute a flying or field Hospital, in the rear of Camp, and appoint proper Surgeons to take direction of it, considering it always as a branch of the General Hospital and to have one common regulation and interest with it.

One Surgeon at least, whom the General may choose, shall always reside near head Quarters, to attend the General and Staff Officers, and to be in readiness for any emergency when a division or detachment of the Army is sent off, or in any manner becomes a distinct and separate body from the Main Army, the Medical board shall nominate its proportion of Medical Staff of which the Surgeon eldest in appointment shall preside, with all the powers of Physician in Chief and director; and shall form a Medical board, to be authorized as before mentioned: and when two Armies unite, having each a separate Board, one shall dissolve of course by direction of the Commanding Officer of the whole.

When Officers of the Line do duty in hospitals, the Medical board shall make rules for their conduct, that they may not interfere with the Surgeons, and they shall receive their instructions by General order.

That the Quarter Master General furnish the hospital Department, from time to time, as occasion may require with such a number of horses and wagons as may be necessary for removing the sick and wounded and for transporting the hospital stores, but that no other horses than those [allowed to be kept by] for which forage may be herein allowed to the Officers of the Department, be kept separately and at the expence of the Department.

That no officer or other person employed in the hospital or Medical Department shall on any account whatever, be concerned in trade for his private emolument and advantage.

That no officer or other person in the hospital or Medical Department except the sick or wounded, be permitted to use any of the stores provided for the sick.

That the Physician in Chief, the Surgeons of the Hospital, Purveyor, Apothecary, Assistant Purveyor and Assistant Apothecary be appointed and Commissioned by Congress. The Regimental Surgeons and Mates to be appointed as heretofore.

That all the Officers in the Hospital or Medical Department shall be subject to trial by Courts Martial for all offences in the same manner as officers of the Line of the Army.

That the pay and establishment of the Officers of the hospital Department and Medical Staff be as follows, payable in silver Spanish Milled dollars a 7/6 a dollar [or other money equivalent.]

Physician in Chief and Director of the Military Hospitals 125 dollars per month 2 rations for himself and 1 for his servant per day and forage for 2 horses.

Surgeons of the General Hospital 90 dollars per month and 2 rations per day and forage for two horses.

Purveyor and Apothecary each 100 dollars per month.

Assistant Purveyor and Apothecary 50 dollars per month each.

Regimental Surgeons each 60 dollars per month, 1 ration per day and forage for one horse.

Surgeons' Mates in Hospitals 40 dollars per month and 1 ration per day.

Do. in the Army 40 dollars per mo. and 1 ration per day.

Steward for each Hospital 30 dollars per mo. and 1 ration per day.

That none of the aforesaid Officers or other persons employed in and of the Hospitals be entitled to rations of provision or forage, when on furlough.

That the Physician in Chief be allowed a two horse covered wagon for transporting his baggage.

That the same allowance be made to the aforesaid Officers for retained rations as is allowed to officers of the line of the army; and also that each of them be annually entitled to draw Cloathing from the Stores of the Cloathier General in the same manner and under the same regulations as are established for Officers of the Line by a resolution of Congress of the 25 Nov. 1779 and in like manner as has heretofore been used.

That the several Officers above mentioned (except Stewards) shall at the end of the War be entitled to a provision of Land in the proportions following viz: Physician in Chief to have the same quantity as a Brigadier General; the Surgeons, Purveyor and Apothecary of the Hospital the same as a Colonel; Regimental Surgeons and assistants to the Purveyor and Apothecary the same as a Major; Hospital and regimental Surgeons' Mates the same as a Captain.

That all former arrangements of the Hospital Department and all resolutions heretofore passed touching the same be repealed.¹⁵⁷

¹⁵⁷ This report is in the *Papers of the Continental Congress*, No. 22, folio 45.

December 20, 1781. 1182

(Note) A memorial of George Glentworth and others, supernumerary physicians and surgeons of the general hospital, was presented this day and referred to the Secretary at War, as the indorsement shows. It is dated December 17, 1781, and is in the *Papers of the Continental Congress*, No. 41, III, folio 483.

December 24, 1781. 1183

An ordinance respecting the hospital department was read the first time:

Ordered, That Wednesday next be assigned for the second reading of this ordinance.

STANDING COMMITTEES ¹⁵⁸

Medical

16 February, 1781. William Burnett

January 3, 1782. 4-7

On a report of the Secretary at War, to whom was referred a memorial of Dr. Glentworth and others:

Resolved, That it be, and hereby is recommended to the State of Pennsylvania, to settle the balance of pay and depreciation due to Doctors G. Glentworth, W. Smith, J. Fallon, S. Duffield and S. Halling, late physicians and surgeons in the general hospital, on the same principles they settled with the other physicians and surgeons of the army, citizens of that State. ¹⁵⁹

On a report of a committee, consisting of Mr. (Abraham) Clark, Mr. (Ezekiel) Cornell and Mr. (Isaac) Motte, to whom was referred an arrangement of the medical department:

The Committee to whom was referred the ordinance respecting the Hospital Department, beg leave to report—

That they have considered the same, and are of opinion that any ordinance for a new establishment of the hospital, (on) the plan proposed, is unnecessary and at this time for many considerations improper they have therefore returned the same in the manner they received it.—Your Committee are nevertheless of opinion that sundry alterations and amendments are necessary to be made to the plan for conducting the General Hospital, passed on the 30th day of September, 1780, and accordingly have herewith submitted such alterations and amendments for the consideration of Congress, in case they shall be of opinion with the Committee, that a new regulation of the Hospital by an Ordinance is at this time unnecessary or improper.—

Resolved, That for the more regular conducting the general hospital, the offices of chief physician and surgeon of the army, and of chief hospital physician, be, and hereby are abolished; and that the chief physician and surgeon to the army, eldest in appointment, be continued in service, under the title

of physician, with the pay and emoluments heretofore allowed to a chief hospital physician:

That the number of surgeons to all the military hospitals of the United States, be reduced so as not to exceed fifteen:

That the director have the general superintendence and direction of all the military hospitals, and of practice both in camp and in hospitals:

That in the absence of the director, his duty devolve on the deputy director or physician, and in their absence on the hospital surgeons, according to seniority:

That the director, or in his absence the senior medical officer, with the approbation of the Commander in Chief, or commanding general of a separate army, be, and hereby is authorized and empowered, as often as may be judged necessary, to call a medical board, which shall consist of the three senior medical officers then present; and it shall be the duty of such board to appoint all hospital mates, to examine all candidates for promotion in the hospital department, and recommend to the Secretary at War such as they judge best qualified; and generally to take cognizance of, and give their opinion and advice on every matter relative to the department, which may be submitted to them by the Commander in Chief, or commanding general of a separate army: provided always, that no regulation, plan or order of the board, shall be valid and take effect, until approved by the Commander in Chief, or commanding general of a separate army, and issued in general orders:

That all returns heretofore ordered to be made by the director or deputy director, to the medical committee, be made to the Secretary at War:

That the stewards may, in the first instance, when the purveyor or his assistant is at a distance, be appointed by the director or senior medical officer, but shall be removeable at pleasure, and others substituted in their stead, by the purveyor or his assistant. And although in their purchases and issues, they are to obey the order of the prescribing surgeons, yet for the faithful discharge of their duty, they are to be accountable to the purveyor, who shall in like manner be accountable to the United States. Wherefore, the said stewards shall keep separate accounts of all they receive, and of what they themselves purchase; and shall render an account monthly of all their issues, with their stock on hand, to the purveyor, who shall render the said accounts, together with a particular account of the supplies furnished by himself or his assistants to each respective hospital, once every three months to the Superintendent of finance:

That the Secretary of War be, and he is hereby empowered and directed, on or before the first day of February next, and hereafter, from time to time, as the service may require, to arrange the department agreeably to the foregoing resolutions, and to issue his orders to such as he thinks proper to remain, paying a due regard in his first arrangement to such of the chief physicians and surgeons as may

¹⁵⁸ See pages 1229 and 1230 of Vol. XVIII. I now give such appointments only as were made in 1781.

¹⁵⁹ This report is in the *Papers of the Continental Congress*, No. 149, I, folio 63. So far as Halling is concerned it superseded the following resolution sent to Congress by the Secretary at War December 18:

Resolved, That the Comptroller be and he is hereby directed to adjust the accounts of Doctor Halling for pay and depreciation on the same principles as the accounts of Doctor Allison were settled. This resolution is on folio 53.

choose to continue in service in the rank of surgeons, and in his subsequent arrangements to such of the senior officers as may choose to remain in service:

That such of the officers as shall not be called into service agreeably to the foregoing resolution, be considered as reduced by Congress, and be entitled to the emoluments granted by the Act of Congress of the 17 January, 1781:

That when by reason of vacancies or otherwise, any officer hereafter to be appointed in the hospital department, and whose appointment is reserved to Congress, [it shall be the duty of the secretary at war to recommend the person or persons best qualified, provided that, in the recommendations for director, deputy director and physician] due regard be paid to the officers next in rank; and that the appointment of hospital surgeons be from among the regimental surgeons and hospital mates; provided that no regimental surgeon shall be so appointed, who shall not have submitted himself to an examination by the medical board, and obtained from them a certificate that he is well qualified for the office of regimental surgeon, by which certificate the regimental surgeon shall be considered as superior in rank to an hospital mate, but not otherwise.

Resolved, That the director, deputy director, physician, surgeons and mates, as well hospital as regimental, receive their pay out of the military chest, at the same time and in the same manner as the army with which they serve; the abstracts to be signed by the director, deputy director or physician, or in their absence by the senior hospital surgeon; and the warrants to issue in the same manner as for the pay of the army.¹⁶⁰

February 20, 1782. 81-2

The committee, consisting of Mr. (Abraham) Clark, Mr. (Ezekiel) Cornell, Mr. (Thomas) McKean, to whom were referred the report of the Secretary at War, on a petition of Dr. Hagan, and the memorials of Dr. Jackson, Dr. Williams, Dr. Eaker, and Dr. Frinke, delivered in a report; Whereupon,

Resolved, That the comptroller be, and he is hereby, authorized and directed to adjust the accounts of all the officers of the late general hospital for pay and subsistence, up to the time the arrangement took place in [October] September, 1780, or for so much of the preceding time as they continued in service, upon their producing proper documents of the time of their respective services.

Resolved, That it be, and hereby is, recommended to the legislatures of the several states, to settle and discharge on account of the United States, the depreciation of pay of such officers in the late general hospital as are inhabitants of, or belong to their respective states, who resigned their appointments after the 10th day of April, 1780, or became supernumerary by the new arrangement in [October] September, 1780.

Resolved, That the comptroller be, and he is

hereby, authorized and directed to settle the depreciation of pay of officers in the late general hospital, who resigned or became supernumerary as aforesaid, and who do not belong to any particular State, in the same manner as hath been provided for the officers of the late Colonel Hazen's regiment.

Ordered, That the account of Dr. Frinke, for taking care of the sick and wounded in the retreat from Ticonderoga, in 1777, and for furnishing supplies for the same, be returned to Dr. Frinke, and the settlement suspended, until authentic vouchers shall be produced respecting such services and expenditures.¹⁶¹

February 26, 1782. 100

(Note) On this day, according to the indorsement, a memorial of Joseph Eaker, of the same date, was read. It is in the *Papers of the Continental Congress*, No. 41, III, folio 71.

April 10, 1782. 179

That the petition of L^t Morris praying for a settlement of his accounts, incurred by his being ordered to take the charge of an hospital in Litchfield in Connecticut, be referred to the Superintendent of Finance.¹⁶²

April 23, 1782. 209

War Office, March 23rd, 1782.

Sir,

There are frequent applications for the discharge of soldiers whose wounds and sickness incapacitate them for all farther duty even in garrison. They prefer a dismission from the service, which shall entitle them to a pension equal to half of their pay, to being classed with the invalids where full pay and every emolument of a soldier would be continued to them.

Was public economy the only consideration in this matter, there would not I think remain a doubt respecting the propriety of adopting this mode of discharge generally. But as it becomes necessary equally to guard against future inconveniences as to

¹⁶¹ This report, in the writing of Abraham Clark, is in the *Papers of the Continental Congress*, No. 22, folio 65.

Eaker's memorial, dated February 18, is in No. 41, III, folio 69; Hagan's, undated, is in No. 41, IV, folio 193; Jackson's, dated January 28, is in No. 41, IV, folio 426.

The Secretary at War's report is in No. 149, I, folio 119, and is as follows:

War Office, January 16th, 1782.

Sir,

On the petition of Dr. Francis Hagan referred, the following resolve is submitted to the consideration of Congress:

That the Comptroller be and he is hereby authorized and directed to adjust the account of Dr. Francis Hagan late Physician and Surgeon in the General Hospital for pay and depreciation in the same manner as have been provided for the officers of General Hazen's Regiment.

The following report, without date, is in No. 149, I, folio 117:

There being a number of officers who by former acts of Congress are entitled to pay or additional pay, and who cannot obtain a settlement of the depreciation due thereon from the respective States of which they are inhabitants.

Therefore, *Resolved*, That the Comptroller be directed to settle the accounts of all such officers on the same principles as he settled with the officers of Colonel Hazen's Regiment.

¹⁶² This report, in the writing of Joseph Montgomery, is in the *Papers of the Continental Congress*, No. 32, folio 347. It is undated but belongs to this period.

¹⁶⁰ This report is in the *Papers of the Continental Congress*, No. 22, folios 43 and 63. The paragraphs preceding the resolutions are in Abraham Clark's writing, the rest is in that of Charles Thomson.

accommodate the wishes of individuals I beg leave to submit the following resolve, which as it only respects those whose private circumstances will enable them when discharged to live independent of any other gratuity than their pension, I think will obviate the possibility of an imputation against the public that they have dismissed such of their servants as could be no longer useful without provision being made to prevent them suffering individually or becoming burthensome to the societies where they might live.

[Congress came to the following resolutions:]

Resolved, That all such sick and wounded soldiers of the armies of the United States, who shall in future be reported by the inspector general, or the inspector of a separate department, and approved by the Commander in Chief, or commanding officer of a separate department, as unfit for farther duty either in the field or in garrison, and who apply for a discharge in preference to being placed or continued in the corps of invalids, [and who can give authentic proof that they either have the means to support themselves, or that their friends will provide for them and prevent them becoming burthensome to the society where they really belong or reside. In that case all such persons shall be discharged, and be entitled to receive as a pension, [the value of half their pay,] five dollars per month, in lieu of all pay and emoluments.

Resolved, That it be, and hereby is, recommended to the several states to discharge such pensions annually, and draw on the Superintendent of finance for the payment of the money they shall advance

And that the foregoing resolution take effect so soon as the Superintendent of the Finances shall signify to the several states, that he has made provision for answering such draughts.¹⁶³

May 3, 1782. 235

On a report from the Secretary at War:

War Office, May 3rd, 1782.

Sir,

To the two companies of Artificers now in this City (making the whole about fifty men) there are attached a Surgeon and a Surgeon's mate. As part of these companies will be detained in this town, part are now at Fort Pitt, part will be sent to Virginia and part of them will join the army under General Greene, this dispersion will render it unnecessary to retain the Surgeon and mate longer in the service.

Should Congress be of this sentiment, and deem some compensation due to their past services they will please to resolve,

Resolved, That as the dispersed situation of the corps of artificers commanded by Captain Wyley, will no longer require the services of Dr. A. McCoskey, surgeon, and Dr. W. McCoskey, his mate, they be considered as reduced and retiring from service

on the 10th instant and that the surgeon be entitled [from that day to receive the same emoluments as heretofore allowed to surgeons and mates retiring under the resolves of the 3^d and 21st October 1780] to all the emoluments heretofore allowed to reduced regimental surgeons.¹⁶⁴

June 6, 1782. 319

Congress proceeded to the election of a deputy purveyor for the southern hospital; and, the ballots being taken, Dr. N. Brownson was elected, having been previously nominated by Mr. (William) Few.

(June 10, 1782.) 322

(Report of Secretary at War, on the arrangement of the Hospital Department.)

War Office, June 7th, 1782.

Sir,

I have, in obedience to the orders of Congress, conferred with the Superintendent of Finance on the report of your Committee respecting the Hospital Department and find it is agreeable to him—

As the Purveyor wishes that the Officers acting immediately under him should be of the same grade—he requests that he may be allowed to appoint three clerks, one of whom will have the charge of the store to be kept near the Army—

He also requests that there may be no distinct allowance of subsistence for himself and the Apothecary, but that the sum intended as subsistence be added to their pay—

I wish the Purveyor's requisitions may be complied with and that the system, as it will then stand, should be adopted.¹⁶⁵

July 23, 1782. 408-12

On the report of a committee, consisting of Mr. (Joseph) Montgomery, Mr. (Abraham) Clark, and Mr. (David) Ramsay, to whom were recommitment their report respecting the hospital department, and the amendments and observations thereon by the Secretary at War:

Resolved, That in conducting the business of the general hospital, there shall be an invariable standard of prices established by which the apothecary shall be charged with every article (received into his department, and at which he shall be credited for every article)¹⁶⁶ he shall issue the standard to be established by the medical board, or such person or persons as they shall appoint, which shall only be considered as a certain ratio whereby to keep the accounts; but that, in the settlement of all accounts in that department, all deficient articles, not issued or returned, shall be accounted for at such real value as shall be estimated by the medical board, and approved of by the Secretary at War.

An account shall be taken as soon as possible, of all the medicines, instruments and property in the

June 5 from General W. Smallwood, enclosing one of same date from Lieutenant Levacher de Vaubrun, asking for a furlough to visit France. They were referred to the Secretary at War. General Smallwood's letter is in No. 101, folio 183, and de Vaubrun's is in No. 78, XXIII, folio 191.

Also a memorial dated June 5 from Oliver Hanchett was referred to the Secretary at War. It is in No. 149, I, folio 447.

¹⁶⁶ The words in parentheses are in the report but not in the Journal.

¹⁶³ This report is in the *Papers of the Continental Congress*, No. 149, I, folios 161-163.

¹⁶⁴ This report is in the *Papers of the Continental Congress*, No. 149, I, folio 303.

¹⁶⁵ This report is in the *Papers of the Continental Congress*, No. 22, folio 81. The indorsement says it was read on this date.

On June 10, according to the indorsement, was read a letter of

apothecary's department belonging to the public, in the hands of the apothecary, the deputies, assistants, and mates, the surgeons of hospitals, and surgeons of regiments, for which they shall severally be charged at the standard value ascertained by the board as aforesaid, and for all they may hereafter receive, but to account for deficiencies at the real value, to be estimated as aforesaid.

The apothecary shall be accountable for all articles in his department to the purveyor throughout the states, until they come into the hands of the prescribers; and all deputies, assistants, and mates, shall make returns, and be accountable to the apothecary for the medicines, instruments and other property belonging to the public in the department, now in their hands, and of such as they may hereafter be possessed of.

The apothecary shall make up his accounts at the expiration of every year, and settle them as soon after as possible, and before the expiration of six months. He shall, at the same time, make out two returns for the director of the hospital, one specifying what has been received and issued, and the amount of what remains on hand; the other exhibiting a particular amount of the value of the medicines, and other public property, each prescriber has received within the year.

All losses which may happen by the events of war, and other circumstances unavoidable, shall be borne by the public. In cases of losses by fraud or neglect in any deputy, assistant or mate, the apothecary shall not be accountable for such losses, provided the delinquent be convicted thereof before a court-martial appointed to try the same.

The hospital prescribers shall be supplied, upon their own application, with medicines and instruments necessary for the sick and wounded under their care.

Every regimental surgeon shall receive yearly from the apothecary, a supply of medicines to such amount, by the above standard, as the medical board shall judge necessary.

Every prescribing surgeon or physician, either in hospital or with the army, shall be supplied by the apothecary with such a set of capital instruments as the medical board shall judge necessary, and shall be accountable for all losses in medicines and instruments not arising from the events of war and other circumstances unavoidable. Duplicates of all returns made by the apothecary to the director, shall be lodged in the war office.

Resolved, That in the army of the United States, excepting the southern army, at present under the command of Major General Greene, the offices of assistant purveyor, and assistant apothecary, and the storekeepers under the purveyor and apothecary, except one storekeeper under the purveyor to keep a store near the army, and all the clerks, except

[one] two to the purveyor, shall hereafter be discontinued.¹⁶⁷

[The committee to whom was referred the letter of the Secretary of War respecting the rank of the surgeons in the hospital department submit the following resolutions:]

That all surgeons of the hospital shall take rank after the director of the hospital, deputy director and physician to the army, in the following order, viz. those surgeons of the hospital, who have been either deputy director, physician general, surgeon general, chief physician, or chief surgeon to the hospital or army, shall take rank next to the above mentioned officers; and their relative rank to each other shall be according to the date of their respective appointments to either of the above offices.

That all such as were regimental surgeons, when appointed senior physician or surgeon to the hospital, shall take rank with such senior physicians and surgeons, agreeably to the date of their first appointment, whether to the regiment or hospital.

All surgeons, the date of whose first appointments, either to regiments or hospitals, shall have been on the same day, shall decide their rank by lot.

[That the pay and subsistence of the officers of the Hospital department and medical staff be as follows:

Director of the Hospital 122 dollars per month four rations per day for himself and servants, forage for two horses and twenty-five dollars per month subsistence.

Deputy Director and Physician each 117 dollars per month three rations per day for himself and Servants, and forage for two horses, and twenty dollars per month Subsistence.

Hospital Surgeons each 96 $\frac{5}{6}$ dollars per month two rations for himself and servant forage for two horses and fifteen dollars per month Subsistence.

Purveyor and Apothecary each 105 dollars per month, one ration and forage for one horse, and fifteen dollars per month subsistence.

Deputy purveyor and Deputy apothecary each 101 $\frac{5}{6}$ dollars per month, one ration, and forage for one horse, and ten dollars per month Subsistence.

Hospital Mates each 45 dollars per month, one ration per day, and five dollars per month Subsistence.

Stewards each 30 dollars per month, one ration per day and five dollars per month Subsistence.

Ward Masters each 23 dollars per month, one ration per day and three dollars per month Subsistence.

That all former Acts of Congress, so far as respects the pay Subsistence rations and forage granted to the before mentioned Officers, shall be and they are hereby repealed.]¹⁶⁸

That for the more convenient subsistence of the officers of the hospital department, they be allowed,

¹⁶⁷ The recommitted report had it: "....."and all the clerks except two to the purveyor one of whom to have the care of the store near the army and all the mates of the apothecary except three be hereafter discontinued."

¹⁶⁸ The recommitted report allowed 119 dollars per month to the director; 116 $\frac{75}{100}$ dollars to the deputy director and physician; 93 $\frac{45}{90}$ dollars to hospital surgeons, three rations for himself and servant and 15 dollars for subsistence; 106 $\frac{60}{90}$ dollars for purveyor and apothecary.

In the *Papers of the Continental Congress*, No. 22, folio 79, on a separate sheet in Charles Thomson's hand, is a copy of this part of the report relating to pay and subsistence, with the following variations in amounts: deputy director 111 dollars per month; hospital surgeons 93 $\frac{3}{4}$ dollars per month, three rations for himself and servant; purveyor and apothecary 106 $\frac{3}{4}$ dollars per month; deputy purveyor and deputy apothecary 101 $\frac{1}{2}$ dollars per month.

including their former allowance of rations and forage as follows:

The director of the hospital, four rations a day for himself and servants, forage for two horses, and twenty-five dollars per month subsistence.

The deputy director and physician, each three rations a day for himself and servants, forage for two horses, and twenty dollars per month subsistence.

Hospital surgeons, each two rations per day, for himself and servant, forage for two horses, and fifteen dollars per month subsistence.

Deputy purveyor and deputy apothecary, each one ration per day, forage for one horse, and ten dollars per month subsistence.

Hospital mates, each one ration per day, and five dollars per month subsistence.

Ward masters, each one ration per day, and three dollars per month subsistence.

That the above allowance of rations, forage, and subsistence to the officers of the hospital department, over and above what they severally were entitled to, at the time of passing this act, shall be charged to them respectively, as advances in part of their monthly pay.

That in the future the pay and allowance of the purveyor and apothecary be the same each as that of a hospital surgeon.

That none of the aforesaid officers, or other persons employed in any of the hospitals, be entitled to rations, forage or subsistence, when on furlough.

That the regulation respecting officers' servants, contained in the Act of Congress of the 11th day of March, 1780, shall not be construed to extend to the hospital department.¹⁶⁹

October 11, 1782. 645

Pursuant to the resolution of the 27 of February last, the Superintendent of finance reports, that he has appointed Mr. Edward Fox, a commissioner for settling the accounts of the hospital department, desiring to be favoured with the orders of Congress if they should disapprove the appointment.¹⁷⁰

November 12, 1782. 722

The Committee of the Week, (Mr. Ralph Izard, Mr. Ezra L'Homedieu, Mr. William Hemsley) report, That the petition of Etienne Halbon on behalf of his wife, *setting forth that there is £12, 10s due to her* from the general hospital for wages as the residue of her pay while nurse in the hospital [as by Dr. Binney's certificate directed to Dr. Bond, Jun., doth appear] be referred to the [Superintendent of Finance] Secretary of War.¹⁷¹

November 25, 1782. 752

War Office, Nov^r 23rd, 1782.

Sir,

The request of Doctor Tucker referred to me involves three questions.

¹⁶⁹ This report, in the writing of a clerk, except the part in parentheses which is in Abraham Clark's writing, is in the *Papers of the Continental Congress*, No. 22, folios 69 and 85. The report was delivered May 15, and on May 30 was referred to the Secretary at War to confer with the Superintendent of finance to report, and recommended. A copy of the recommended report is in No. 22, folio 73. The few changes made in their report by the Committee are noted. The portion in parentheses was not in the recommended report.

The first is whether he is entitled to half pay allowed to other retiring hospital officers of his rank—the second whether he is entitled to pay for his attendance on the hospital in Virginia, and the third what allowance will be made for his expences while attending the sick in Charlestown.

There cannot be a doubt with respect to the first. The resolves of Congress of the 17th of January 1781 fully secure to him the half pay allowed to other officers of his rank as he was not deranged until the 15th of May following.

On the second question I would observe that by the resolves of Congress passed May 15th 1781 it is ordered that all officers of the Medical department appointed under the directorship of Doctor Olyphant who were then in captivity in South Carolina and Georgia, and had the charge of sick prisoners in those States be continued in their respective offices as heretofore—and be considered as vested with the same privileges and emoluments as they had enjoyed before their captivity, to extend no farther than to the troops and hospitals within the enemy's lines.

The Continental Hospitals on the first of July, 1781, removed from Charlestown to Williamsburg in Virginia. The hospital was there continued under the care of Doctor Tucker by order of the Marquis de la Fayette as the sick could not at that time be removed into the country. The Commander in chief, on his arrival in Virginia, directed the gentlemen in the Medical Department from South Carolina to do duty in the general hospital at Williamsburg. These are facts which appear from the enclosed papers.

With respect to the last question which relates to an allowance for the extraordinary expences while detained in Charlestown attending the hospital, I suppose they were necessarily great, but he has not rendered any account of them.

On the whole of his request I beg leave to submit to the consideration of Congress the following draft of a resolve,

That Doctor Thomas T. Tucker, late a senior Surgeon of the hospital under the directorship of Doctor Olyphant, enjoy all the emoluments of his office from the date of his appointment to the time he retired from actual service in the hospital in Virginia, and that a reasonable compensation be made him for his extra expences while acting as senior Surgeon in Charlestown after its surrender.¹⁷²

December 3, 1782. 759

Resolved, That after the fore-mentioned period, in lieu of the pay and rations allowed to the officers of the hospital department, including rations for servants, they shall be entitled to the following monthly pay and subsistence; provided in like manner, that where the said subsistence money shall not be

¹⁷⁰ This report is in the *Papers of the Continental Congress*, No. 137, I, folio 817.

¹⁷¹ This report, in the writing of Ralph Izard, is in the *Papers of the Continental Congress*, No. 32, folio 413. It was passed this day, as the indorsement shows.

¹⁷² This report is in the *Papers of the Continental Congress*, No. 151, folios 39-43. It is indorsed: Recommended That the secretary may include in the resolution all those in similar circumstances and to report a reasonable allowance for expences while in Charlestown.

paid, they shall be entitled to draw an equivalent number of rations, at the rate of four dollars for each ration per month, viz.

The director, one hundred and two dollars pay and sixty dollars subsistence.

The deputy director and physician, each one hundred dollars pay and forty-eight dollars subsistence.

The surgeons, each ninety dollars pay and forty dollars subsistence.

Apothecary and purveyor, each ninety-two dollars pay and thirty-two dollars subsistence.

Deputy apothecary and deputy purveyor, each fifty-nine dollars pay and sixteen dollars subsistence.

Mates, each forty-two dollars pay and twelve dollars subsistence.

Stewards, each thirty-one dollars pay and eight dollars subsistence.

Ward masters, each twenty-one dollars pay and eight dollars subsistence.¹⁷³

BIBLIOGRAPHICAL NOTES

January 3, 1782. 885

Hospital Department.

375. By the United States in Congress assembled, January 3, 1782.

4.° Broadside in two columns.

Report of Clark, Cornell and Motte. A copy is in the John Carter Brown Library. It measures 20,5 x 21 cm.

July 23, 1782. 887

Hospital Department.

384. By the United States / in Congress assembled, July 23d, 1782. /

Resolved, / That in conducting the business of the General Hospital, . . .

F.° Broadside of two columns.

Report of Montgomery, Clark and Ramsay. A copy is in the Library of Congress, Washington Papers. It measures 40,5 x 30,5 cms.

February 28, 1783.

The committee of the week (Mr. William Hemsley, Mr. Benjamin Hawkins, and Mr. Phillips White) report: That the memorial of Charles Mortimer of Virginia Doctor of Physic, praying payment of his account, and the usual wages and rations allowed to others; for attending the hospital at Fredericksburg⁷ for nine months be referred to a special committee.¹⁷⁴

March 6, 1783.

War Office, March 5th, 1783.

Sir,

There are many officers, who have been wounded in the service of the United States, who are thereby rendered incapable of farther duty either in the field or in garrison, and who wish to retire from the army. No other provision has been made for such

officers than what they may receive by annexing themselves to the Corps of Invalids.

This is distressing to the individuals, and expensive to the public.

I beg leave to suggest the propriety of permitting those officers, who have been wounded in service, and who wish to leave the army, to retire to their respective homes with allowances proportioned in some measure to their inability.¹⁷⁵

March 22, 1783.

That all officers belonging to the hospital department, who are entitled to half pay by the resolution of the 17th day of January, 1781, may collectively agree to accept or refuse the aforesaid commutation, signifying the same through the Commander in Chief within six months from this time: that [the deranged] such officers [what] as have retired at different periods, intitled to half pay for life, [shall be intitled to the same commutation] may collectively, in each State of which they are inhabitants, accept or refuse the same; their acceptance or refusal to be signified by agents authorised for that purpose, within six months from this period; that with respect to such retiring officers, the commutation, if accepted by them, shall be in lieu of whatever may be now due to them since the time of their retiring from service as well as of what might hereafter become due; and that so soon as their acceptance shall be signified, the Superintendent of Finance be directed to take measures for the settlement of their accounts accordingly, and to issue to them certificates bearing interest at six per cent. That all officers intitled to half pay for life not included in the preceding resolutions, may also collectively agree to accept or refuse the aforesaid commutation, signifying the same [by their agents authorized for that purpose] within six months from this time.¹⁷⁶

March 26, 1783.

Resolved, That Dr. Charles Mortimer's account be settled for pay and rations on the same principle as a junior surgeon, for the term of nine months, during which he appears to have been in the public service:

That the director-general in the hospital department, take order for delivering to Dr. Mortimer a quantity of medicines equal to what he has expended in the public hospital.¹⁷⁷

March 31, 1783.

War Office, March 27th, 1783.

Sir,

On the petition of the late sergeant Menerson referred to me, I beg leave to report that there are more than twenty thousand men who have similar pretensions to be supplied with clothing from the

¹⁷³ This report, in the writing of Alexander Hamilton, is in the *Papers of the Continental Congress*, No. 21, folio 309.

¹⁷⁴ This report, in the writing of William Hemsley, is in the *Papers of the Continental Congress*, No. 32, folio 449. The indorsement gives at this date. The memorial is in No. 41, VI, folio 297. It was referred, the indorsement states, to Mr. (John Lewis) Gervais, Mr. (Hugh) Williamson, and Mr. (Theodorick) Bland.

¹⁷⁵ This report is in the *Papers of the Continental Congress*, No. 149, II, folio 315. According to the indorsement it was referred on this day to Mr. (Alexander) Hamilton, Mr. (Richard) Peters and Mr. (Daniel) Carroll. See *ante*, December 19, 1782.

¹⁷⁶ This report, in the writing of Alexander Hamilton, is in the *Papers of the Continental Congress*, No. 21, folios 332 and 315. The vote was transcribed by Thomson on the report.

¹⁷⁷ This report, in the writing of Hugh Williamson, is in the *Papers of the Continental Congress*, No. 19, IV, folio 445.

United States, and with whose claims it is altogether impossible to comply.

If it shall appear upon a Surgeon's examining his wounds, that he has been thereby incapacitated from earning his bread, I would beg leave to recommend him to the provision made for disabled soldiers by the resolves of Congress of April 22nd, 1782.¹⁷⁵

April 22, 1783.

On the report of a committee, consisting of Mr. (Oliver) Ellsworth, Mr. (Hugh) Williamson and Mr. (Abraham) Clark, to whom was referred a letter of 22 June, 1781, from Dr. George Gilmer:

Resolved, That the account of Dr. G. Gilmer for pay and rations, be settled on the same principles as the accounts of other hospital surgeons of the same rank, according to the time he shall appear to have been employed in the public service; and that the purveyor general return to Dr. George Gilmer a quantity of medicine equal to what he expended out of his private stores, for the use of the continental hospital under his care.¹⁷⁶

April 30, 1783.

On a report from the Superintendent of Finance, to whom was referred a letter of the 17th from Darius Stoddard:

Ordered, That the commissioner for settling the accounts of the hospital department, adjust and liquidate those of Dr. Darius Stoddard.¹⁸⁰

May 1, 1783.

Resolved, That the corps of Invalids be reduced, such officers as have lost a leg or been [otherwise] equally disabled in service to retire on full pay for life, [or at their option collectively to the amount of seven years full pay in gross] such officers as may not be included in this description to retire on [half pay for life] the same principles with other officers of the army, such non commissioned officers and soldiers as being strangers in the country and having been disabled in service are incapable of providing for their own subsistence and are proper subjects for a hospital, to be received into some fixed hospital, to be appropriated for the purpose, and there supported during life on such provision as may be hereafter determined, to be entitled in the meantime to their usual rations and clothing; and such non commissioned officers and soldiers disabled in service as may have homes to which they can retire, to be discharged on the principles of the resolution of the 23rd of April last.

That the Secretary at War be directed to take proper measures previous to the reduction to ascer-

tain the different classes above described, [and to report a list of them respectively to Congress.]

That the officers who shall retire on full pay, may at their option collectively accept in lieu of such full pay for life the amount of years full pay [in money or securities] on the terms of the resolutions of the last.

That at the reduction of this Corps all the officers and men shall receive one month's pay and shall share in any further payments which may be made to the other parts of the army when reduced.¹⁸¹

May 12, 1783.

That the accounts of Doct. Jonathan Arnold be liquidated and settled by the commissioner for settling the accounts of the hospital department, who is hereby authorised to allow him pay and rations as an Assistant Deputy Director General in the said department from the 7 day of Jany. 1778 the time to Recommended which his accounts were settled by the State of Rhode Island, to the 9th of May 1779 when he was discharged, charging him with the monies advanced him for the use of that Department by the State of Rhode Island and crediting the said State for the same in account with the United States.

That the claim of the officers of a Brigade raised in the State of Rhode Island in Feby., 1779 for one year, with the approbation of Congress, for depreciation of their pay, is inadmissible, no allowance of that kind having been made or approved by Congress to any officers or soldiers discharged from service before the 10th of April 1780.¹⁸²

May 16, 1783.

Resolved, That the Commissioner for settling the accounts of the Hospital department be and he is hereby authorized and directed to audit and settle the accounts of Dr. Jonathan Arnold, as Assistant Deputy Director in the Eastern Department from 7th January, 1778, to May 9th, 1779, as well for all supplies and expenditures as for pay and rations, and that he also settle the accounts of all those who were necessarily employed in hospital service by the said Dr. Arnold within the term aforesaid. That their pay and other allowances be the same as by the resolutions of Congress are allowed to those of similar stations in the hospital department. And that the said commissioner allow in such settlement for depreciation upon all advances and sums due to each respectively, with an interest of six per cent. per annum from the times they became due.¹⁸³

May 23, 1783.

That the petition of William Stevens and others, mates to the general hospital in the Southern de-

¹⁷⁵ This report is in the *Papers of the Continental Congress*, No. 149, II, folio 407. According to the indorsement it was read on this day.

¹⁷⁶ This report, in the writing of Hugh Williamson, is in the *Papers of the Continental Congress*, No. 19, II, folio 417.

¹⁷⁷ This order is in the *Papers of the Continental Congress*, No. 137, II, folio 387.

¹⁷⁸ This report, in the writing of Alexander Hamilton, is in the *Papers of the Continental Congress*, No. 31, folio 273. The indorsement states that it was delivered this day.

¹⁷⁹ This report, in the writing of Oliver Ellsworth, is in the *Papers of the Continental Congress*, No. 19, I, folio 179. The indorsement states that it was reported this day, and on "September 9, 1785, Arnold's accounts referred to the committee for settling hospital accounts. This to be filed." See *post*, June 10.

¹⁸² This motion, in the writing of Jonathan Arnold, is in the *Papers of the Continental Congress*, No. 42, VI, folio 485. Committee Book, No. 186, gives it this date. It was referred to Mr. (Oliver) Ellsworth, Mr. (Hugh) Williamson, and Mr. (John Lewis) Gervais. See *post*, June 10, 1783.

partment, praying to be allowed half pay or compensation be referred to a special committee.¹⁸⁴

June 10, 1783.

Resolved, That the commissioner for settling the accounts of the hospital department audit and settle the accounts of Doc^t Jonathan Arnold, as assistant deputy director in said department from the 7th day of Jan'y. 1778 to the 9th day of May 1779, as well for all supplies and expenditures as for pay and rations charging him with the monies advanced him for the use of said department by the State of Rhode Island and crediting the said State for the same in account with the U. States, And that he also settle the accounts of all those who were necessarily employed in hospital service by the said Doctor Arnold within the term aforesaid, and that their pay and other allowances be the same as by the resolutions of Congress are allowed to those of similar stations in the said department.¹⁸⁵

July 4, 1783.

The committee of the week, (Mr. William Ellery, Mr. Jacob Read and Mr. Jonathan Arnold) report that the petition of the Rev^d William Plumb late chaplain to the Northern Hospital praying for an adjustment and payment of his accounts be read in Congress with the papers accompanying the same.

That the petition of Grace Mercer Widow of Richard Mercer Esq^t, late of Charles Town in the State of South Carolina deceased Purveyor to the Hospitals of the army of the United States in the said State of South Carolina be referred to the Superintendent of Finance to report.¹⁸⁶

July 11, 1783.

The Superintendent of Finance to whom was referred the petition of Grace Mercer Widow of Richard Mercer Esq^t Purveyor to the Hospitals of the United States in South Carolina begs leave to report

That if, as is alledged, the Paper Money therein mentioned remained in the Hands of the said Richard Mercer from the time in which he received it until his Death and from that time to the present in the Hands of his widow the Delivery of it ought to discharge the said Richard Mercer's Estate in account with the United States from the value which so much money was of at the time it was received by him. And the Delivery of the said Money into the State Treasury of South Carolina ought in like manner to discharge the United States from the like value in account with the said State.

That the Commissioner for Settling the Hospital Accounts will therefore on proper Proof made to him of the Facts above stated receive the said money and credit the same in the account of the said Richard Mercer and will transmit the money and Proof to the Commissioner for Settling the accounts of the

United States with the State of South Carolina who will enter it in those accounts to the Credit of the United States. Office of Finance 8 July, 1783.¹⁸⁷

July 23, 1783.

On the report of a committee, consisting of Mr. (Richard) Peters, Mr. (Abraham) Clark, and Mr. (Stephen) Higginson, to whom was referred a report of the Superintendent of finance, on a petition of Mrs. Grace Mercer:

The Committee to whom was referred a memorial of Mrs. Grace Mercer, relict of _____ Mercer, late Purveyor of the hospital in South Carolina, report,

That the time when the particular purpose for which the said money was received or the reason why the same was not applied to the use intended do not appear; and as a permission granted to public Officers to return paper money received at periods of depreciation would establish a Precedent which may be productive of many ill consequences Your Committee are of opinion,

Ordered, That the superintendent of finance transmit to the commissioner for settling the accounts of the hospital department, a copy of the memorial of Mrs. Grace Mercer, and in the settlement of the accounts of the late Mr. Mercer, due enquiry be made by the said commissioner, into the causes of the detention of the money therein mentioned; and that the said commissioner report the result of such inquiry to the superintendent of finance, who is hereby authorised to take order therein as shall appear to him just, on such report being made.¹⁸⁸

August 5, 1783.

The Superintendent of Finance to whom was referred the Petition of Grace Mercer, widow of Richard Mercer Esq^t, Purveyor to the Hospitals of the United States in South Carolina, begs leave to report.

That if, as is alledged, the paper money therein mentioned remained in the Hands of the said Richard Mercer from the time in which he received it until his Death and from that time to the present in the hands of his widow the Delivery of it ought to discharge the said Richard Mercer's estate in account with the United States from the value which so much money was of at the time it was received by him—and the Delivery of the said money into the State Treasury of South Carolina ought in like manner to discharge the United States from the like value in account with the said State.

That the commissioner for settling the Hospital accounts will therefore on proper Proof made to him of the facts above stated receive the said money and Credit the same in the account of the said Richard Mercer and will transmit the money and the Proof to the commissioner for settling the accounts of the United States with the State of South Carolina who will enter it in these accounts to the Credit

¹⁸⁴ This report, in the writing of Thomas Fitzsimmons, is in the *Papers of the Continental Congress*, No. 42, V, folio 290. Stevens' petition is in folio 287. The indorsement shows the action taken.

¹⁸⁵ This report, in the writing of Oliver Ellsworth, is in the *Papers of the Continental Congress*, No. 19, I, folio 181. The indorsement states that it was delivered and read this day.

¹⁸⁶ This report, in the writing of Jacob Read, is in the *Papers of the Continental Congress*, No. 32, folio 509.

¹⁸⁷ This report is in the *Papers of the Continental Congress*, No. 137, II, folio 607. The indorsement shows that it was read this day and on July 16 referred to Mr. (Richard) Peters, Mr. (Abraham) Clark and Mr. (Stephen) Higginson.

¹⁸⁸ This report, in the writing of Richard Peters, is in the *Papers of the Continental Congress*, No. 19, IV, folio 55. The indorsement states that it was passed on this day.

of the United States. Office of Finance, 31 July, 1783.¹⁸⁹

August 12, 1783.

The committee, consisting of Mr. (James) McHenry, Mr. (Hugh) Williamson and Mr. (Abraham) Clark, to whom was referred a petition of Dr. Dirk Van Ingen, praying that depreciation may be allowed him in the settlement of his account, report, "That as Dr. Van Ingen, who served for some years as surgeon, in the continental hospital, appears by his petition to have [resigned or to have been left out of promotion] been reduced as a supernumerary before the 10th of April, 1780, [depreciation, therefore, cannot be allowed him without departing from the rule hitherto adopted and opening an account which may occasion much trouble and be a precedent for a variety of claims of officers in different departments,] and as no depreciation [to officers in every department] has been allowed to officers who left the service before that period, [has been constantly refused,] Dr. Van Ingen's claim can not be admitted without infringement of the rule established by Congress."¹⁹⁰

September 2, 1783.

The committee of the Week (Mr. Jacob Read, Mr. Abiel Foster and Mr. William Ellery) on consideration of the petition of Ebenezer Augustus Smith formerly a Surgeon in the General Hospital praying that depreciation may be allowed him, report as their opinion that the request of the said Ebenezer Augustus Smith being similar to that of Dr. Dirk Van Ingen lately determined by Congress can not be granted without infringing the rule established by Congress of the 10th day of April 1780.¹⁹¹

September 10, 1783.

The same reason which makes it proper to have two Serjeant Majors &c. in each Regiment of Infantry, will make it equally necessary to have two Surgeon's Mates,

October 23, 1783.

No Regiment to be allowed to draw rations for more than four women to serve as nurses in the Regimental Hospitals and to receive four dollars per month in addition to a ration per day.

General Hospital

A general hospital for the reception of the invalids of the army and navy will be necessary to consist for the present of the following persons:

1 Director to have at the same time the Superintendence of the Regimental Hospitals . . .	80
1 Surgeon	50
4 Mates each	25
1 Purveyor and Apothecary	50
1 Steward	15
4 Nurses each	5

¹⁸⁹ This report is in the *Papers of the Continental Congress*, No. 137, II, folio 731. According to the indorsement it was delivered this day. It was ordered to be filed among obsolete reports. Mr. Mercer's petition is on folio 735.

¹⁹⁰ This report, in the writing of James McHenry, is in the *Papers of the Continental Congress*, No. 19, VI, folio 109.

¹⁹¹ This report, in the writing of Jacob Read, is in the *Papers*

To be entitled to draw each a ration of provisions per day, but to no other allowance.

The invalids to receive one dollar per month, and the provisions and clothing of a common soldier during life.

Not quite exact but very near the truth	The total expence of this establishment [if complete] as reduced in peace, would amount to about	359,530 [531,950]
	Deduct the product of the manufactories which is estimated at	131,950
		\$227,580
	Balance an annual charge upon the United States ¹⁹²	[400,000]

October 31, 1783.

The Secretary at War reported, that the following lines, corps and individuals, have agreed to accept the commutation of five years' pay, in lieu of the half pay for . . . as appears by the papers accompanying his report: . . . hospital department, and Dr. Tilton, Dr. Bodo Otto, Dr. Frederick Otto, Dr. Martin.

November 4, 1783.

The Committee to whom was referred the letter of Major General Lincoln of the . . . have examined the list of bills drawn by him whilst commanding in the Southern Department, and find sufficient vouchers to support charges against the Commissary of purchases, the Quarter Master, the Clothier, the Pay Master, Purveyor of the Hospital and the Navy, for five millions four hundred and twenty four thousand one hundred and nine dollars; and that bills to a considerable amount are yet outstanding, which when presented for payment ought also to be charged to the Departments in whose favor they were respectively drawn. Wherefore your Committee submit the following resolution:

Resolved, That Major General Lincoln be credited, in the books of the treasury, the sum of five millions four hundred and twenty four thousands one hundred and nine dollars, and that the several departments be charged with the amount of the bills drawn in their favor. And that all such bills as may hereafter be presented for payment, be charged to the departments in whose favor, from the face of the bill, they shall appear to have been drawn; and that Major General Lincoln be credited for the amount thereof.¹⁹³

June 2, 1785.

Resolved, That those officers of the hospital department in the southern army, who were detained in Charleston, after its surrender to the British troops, for the purpose of attending the sick and wounded of the army of the United States, which, in consideration of the extra expences which they in-

of the *Continental Congress*, No. 32, folio 517. According to the indorsement it was agreed to on this day. Smith's petition, dated Wilmington, April 10, 1783, is in No. 42, VII, folio 161.

¹⁹² This report, in the writing of Alexander Hamilton, is in the *Papers of the Continental Congress*, No. 38, Folios 413-442.

¹⁹³ This report, in the writing of Samuel Osgood, is in the *Papers of the Continental Congress*, No. 19, III, folio 677.

curred by the performance of the said duty, be allowed the sums affixed to their respective names contained in a return deposited in the war-office, which was transmitted and signed by David Oliphant, deputy director of the southern hospital.

June 20, 1785.

On the report of a committee, consisting of Mr. Williamson, Mr. Stewart, and Mr. Howell, to whom was referred the petition of Dr. J. Morgan,

Resolved, That when ever Dr. J. Morgan, shall have accounted for the stores delivered to his care, or when the several charges against his former department shall have been delivered in, and it shall appear to the commissioner for settling the hospital accounts, that the doctor's papers and books are unavoidably destroyed, or that he has rendered the best account of the stores committed to his care, of which the circumstances of the case would admit he shall obtain a certificate for the balance due him.

May 8, 1786.

Resolved, That the powers and duties heretofore exercised by the commissioners for the quarter master's and the commissary's departments be exercised by one commissioner, and that the powers and duties

of the commissioners for the hospital, marine and clothier's departments be exercised by one other commissioner, to be elected annually by Congress: and that the salary of each of the said commissioners be at the rate of 1250 dollars per annum.

June 28, 1786.

The commissioner for settling of the accounts of Robert Johnson, the commissioner for settling the hospital accounts &c. be directed to examine strictly into the propriety of all extra expenses incurred in the executing their duties, and where it shall appear that such expenses were necessarily and unavoidably incurred, and that the subsistence allowed was not adequate thereto, the surplus be allowed. That, as it appears from the deposition of the said Dr. Robert Johnson, that the sum of money and certificates stated in his memorial, were public monies stolen from him, without any negligence on his part, and that the balance of money remaining in his hands has not been applied to any use since it came into his possession, the commissioner for settling accounts of the hospital department, be directed to pass the amount of those sums to his credit, on his returning to the commissioner the said balance and a list of the certificates so stolen.

EXPERIMENTAL SECTION AND HEMI-SECTION OF THE SPINAL CORD

When the whole body experiences a loss of function in the nerves it indicates that they themselves are affected, which can be proved by dissection. When all the nerves lose sensation and motion at once, the affection is called Apoplexy. If one-half, whether the right or the left, is attacked, we call it Paralysis (Hemiplegia) of the right or left side. In like manner, as it occurs in one of the extremities, it is a paralysis of that part. Paralysis, in fact, sometimes attacks a whole arm or leg, sometimes only the foot and the parts below the knee or the corresponding parts in the arm. Dissection has taught us that for all the parts of an animal below the neck which are capable of voluntary motion, the corresponding motor

nerves arise from the dorsal part of the spinal cord. . . . You have seen that the motor nerves controlling the chest have their origin from the cervical part of the cord, and further you have been taught that a transverse incision of the entire cord deprives all parts of the body below it of sensation and motion, seeing that the cord derives the faculty of sensation and of voluntary motion from the brain. You have seen further in our dissection that transverse hemi-sections, which do not cut deeper than the centre of the cord, do not paralyze all the inferior parts of the body but only those directly underneath the incision, the right when the right side of the cord has been cut and vice versa.

Galen de locis affectibus

By ABRAHAM JACOBI

NEW YORK

THE end of the first half of the nineteenth century saw wonderful changes in medicine. Nitrous oxide and ether in America, chloroform in Great Britain, the breaking away of German medicine from metaphysics and nature philosophy, the Vienna school, the foundation by Virchow of the *Archiv für pathologische Anatomie und Physiologie*, the teachings of Louis and Broussais in France—all of them were destined to work what seemed the miraculous in our art and science. Those of us who have lived at or since that time, and certainly those who were fortunate enough to see it all, have experienced evolutions and emotions which stirred the hearts, fortified the minds, and roused hopes for the future. Among the few, if there be any, advantages we older men have over you who are our juniors, is the very fact that we have lived, and in a measure participated, in the revolution passing over these five or six or seven decades; it was not always a smooth revolution.

I learn that the first law to prevent the introduction of adulterated pharmacological medicines into the United States was passed as late as 1848. Dr. Bailey, the first incumbent of a new office, in a report to the New York Academy of Medicine, stated that over 90,000 pounds of false and adulterated drugs were rejected during the first nine months at the single port of New York. Forty years later my learned and revered friend, Squibb, complained to me of the difficulties encountered in meeting the demands of an honest and conscientious supply of drugs. An additional retrospect, brief and summary, may be permitted for a few paragraphs.

A medical school was formed at Cam-

bridge on September 19, 1782. Two full courses of lectures were required, as at Philadelphia. As the course was only one of four months, it was expected that the remaining sixteen months of the two years were to be filled with private instruction. The Harvard School which conveyed a degree of Bachelor of Medicine only, which might be converted into Doctor of Medicine after an interval of three years, changed its degree to that of M.D. in 1811. In 1871, Dr. Francis Minot was given, in addition to his title of Assistant Professor of the Theory and Practice of Physic, that of Clinical Lecturer on the Diseases of Women and Children. Both he and Dr. Calvin Ellis, the Professor of Clinical Medicine, aided pediatrics by being made special instructors. They, however, were replaced by Dr. Charles Pickering Putnam who was appointed Lecturer on Diseases of Children in 1873. He retired from the school in 1878. From time to time, though rarely, questions referring to pediatrics appeared on the examination papers until 1879, when Dr. Joseph Pearson Oliver and Dr. Thomas Morgan Rotch were appointed clinical instructors. The latter was placed in entire charge of pediatrics, teaching as Instructor in Diseases of Children, in 1885; in 1888 he was given the title of Assistant Professor of Diseases of Children, and a seat in the faculty. Dr. Rotch asserted that this happened only in consequence of the strong suggestion expressed in the introduction to the five volumes of Keating's "Cyclopedia of the Diseases of Children". Finally, in 1893, he was made full professor of that branch. A full professorship of that branch had meanwhile been held, since 1888, in the Medical School of Denver by Dr. Herbert

P. Whitney who had been an assistant at Harvard from 1887 to 1888. This latter position has since been filled by Edward Marshall Buckingham until his death, which occurred a few years ago.

Up to 1840 there were thirty-two medical schools in the whole country, with 2,500 students. In 1876 there were sixty-four schools with 6,650 students. Sixteen of these, sixty-four offered hardly anything which looked like clinical instruction.

Dr. Harold C. Goodwin, the Superintendent of the Albany Hospital, says:¹ "It is recorded that the first step taken by any hospital toward teaching was in 1762 when the Pennsylvania Hospital founded a medical library. It was not until 1765 that, through the efforts of Thomas Bond, bedside instructions were given. The New York Hospital, in 1776, did the same." The author adds that "a medical library is more necessary to a student than a stethoscope"—which would prove that in the eyes of a mere superintendent, bedside instruction is of a doubtful character. Tastes differ.

According to Thomas F. Harrington,² section-teaching in clinical surgery was inaugurated in 1890 by Professor Charles B. Foster at Harvard. The same method of systematic individual teaching has been extended to clinical medicine and obstetrics. In and after 1902, the fourth year of study was left to electives under certain regulations, so as to enable a student to perfect himself in the "line of work he intends to practice". This doubtful method was highly praised by many. Still all men and classes enjoy the privilege of mistakes they make and those they find in others. For instance: The elective way of study was methodically praised and fostered by Charles Eliot of Harvard; and abrogated by his immediate successor, Dr. Lowell. I well remember the almost comical impression caused by the discrepancy of the happenings at the pres-

idential celebration of 1907 of the two famous presidents of Harvard. Within a single hour Eliot spent all his eloquence on the elective methods of study he had rendered popular among the young men of the University, and Lowell, on the contrary, praised the exact methods of restrictive teaching as the source of correctness and fundamental solidity.

At all events, the official section-teaching of 1890 did not arrive early and systematically, or uniformly. It arrived thirty years after that which I shall now refer to as the systematic bedside teaching of the New York Medical College, which was first established in 1850. Now thirty years seems to mean a great deal in this young country of ours.

From the pages of history and from what I personally know, and particularly from "A Short Sketch of the New York Medical College", by Edwin Hamilton Davis, A.M., M.D., New York, 1883, I cull the following: The subjects which especially interested the profession seventy and sixty years ago were certain reforms in medical education. The medical profession became more and more aware of the fact that the medical schools followed their old indolent methods of instruction. These schools were private enterprises, being mostly founded and maintained for private purposes and gain. The instruction gathered in them did not satisfy those few men who meant to become accomplished physicians; they went abroad, no longer exclusively to Edinburgh, as in the eighteenth century, but also to France where Broussais and Louis taught Jackson, Holmes, Bowditch, Francis, and others.

County and state medical societies, which means the profession at large, urged the schools to change their methods in regard to the quality and quantity of their teaching, but in vain. Then it was that the Medical Society of the State of New York—

¹ *Albany M. Ann.*, Jan., 1918.

² *St. Paul M. J.*, April, 1906.

founded in 1806—called a convention of the prominent medical men of the whole country to consider these defects and to urge improvements in the schools. The second call proved successful. One hundred delegates from thirteen states assembled in New York in 1846. Many schools, remember the schools were the organized schools, were bitterly opposed to the movement—unfortunately, not for the last time; for even when thirty and more years afterward the fight was up for increased medical requirements of matriculation in medical schools and of state requirements before the license to practice should be granted, it was the organized schools that opposed it openly; and when public opinion became too strong and demoralized to be openly thwarted, two of the three great schools of medicine in New York City sent their strongest men with their influence to Albany for clandestine wire-pulling. They were, I am sorry to say, A. L. Loomis and Austin Flint, Jr. They did not succeed, however, in their endeavors. It is now conceded that the wisdom of the New York State Medical Society, displayed in 1882 in its modification of the Code of Ethics of the American Medical Association and in coöperation with all classes of legal graduates and practitioners, secured for us, and for most of the states of the Union which followed our example, laws which raised the standard of medical education, gave our students greater facilities, and protected the public by restricting ignorance or quackery.

In the Convention of 1846, committees had been appointed to report in 1847. In that year the Convention met in Philadelphia; it was there that the American Medical Association was founded. For years after, it urged the schools to adopt, among others, the following changes: 1st, to increase the length of the lecture term; 2nd, to increase the number of professorships; 3rd, to separate the granting of degrees from the Board of Official Teachers.

As not a single one of the existing schools saw fit to adopt a single one of these recommendations, the reform element in the profession established a few new schools. Dr. Davis reports: "*Thus the New York Medical College was called into existence.*" It was chartered April 8, 1850. Its cornerstone was laid July 31, 1850, and the building was inaugurated on the 16th of October. The first Commencement of the new school was held in March, 1851.

It was the *first* to wholly conform to the changes advised by the American Medical Association. Its building, 112 East 13th Street, the most convenient for the comfort of the teachers and the public, of any in the country, contained three large lecture rooms, so that the classes were never compelled to occupy the same hall during two consecutive hours. The entire front of the building was devoted to the chemical laboratory and museums. Here in 1850 was founded the first chemical laboratory in the United States in connection with a medical college established for the instruction of students in medicine in analytical researches important in medical practice. Each candidate for graduation was examined before a Board of Censors.

The lecture term was lengthened and a summer course was established. The number of professors was gradually increased to ten, in place of the familiar seven, or less. The charter strictly separated the power of granting degrees from the Board of Trustees, as Section V., "provides for the appointment of a Board of Censors to be taken from the profession not connected with the College, without whose consent no degree could be conferred".

To remove all pecuniary temptation to increase the number of graduates, the same section provided that no fee should be charged for granting a degree. Finally, the Faculty, realizing the vast importance of combining more *clinical* with didactic instruction, procured a charter for a

hospital to be located alongside of the College.

While awaiting the raising of funds to build, they organized and opened a charity ward in the College itself. In that ward I taught in 1860 and after, until both the ward and the college were discontinued—for discontinued they were. That is the brief history of the *first attempt at establishing a regular daily bedside clinic* for all branches of instruction in the indispensable parts of medical teaching. The twenty-seven beds were ours, and in daily, almost hourly, use. This should be recognized and remembered as a new and systematic teaching, the first one in America, and should be remembered as one of the progressive steps in American medical instruction. When it was discontinued in 1864, it had no successor until in 1898, when bedside instruction was established for the students of the College of Physicians and Surgeons. In that year, Dr. Francis Huber, my friend and assistant, furnished to Columbia University a capital the interest of which enabled the College of Physicians and Surgeons to facilitate a regular pediatric clinic with exclusive bedside instruction in Roosevelt Hospital.

The nefarious example of rival schools that kept on granting diplomas after two short winter courses, and the iniquitous tendency of the students to rush into practice with the least possible expenditure of money, time, brains, and knowledge, and the additional disadvantage of the Medical College caused by the fact that very many of our students were Southerners who ran or strayed away during the Civil War, made the life of the institution hard, and finally impossible. The last class was graduated in 1864.

Dr. Edwin Hamilton Davis, the Professor of Materia Medica, reports one of the ways in which the small Medical College was injured by a combination of the clouds and a thief. Our very blank diplomas—thirty-odd in number—were stolen. A vio-

lent storm blew off a skylight and soaked a number of documents. When new ones were procured, the old ones were left uncanceled and misused. The wrinkled specimens were taken away when the janitor was dismissed a few months later. He disposed of them in this country and also in London. From London a few were sent to New York for certification. This caused an opportunity for eliciting the facts that a number of the forged diplomas appeared in the market.

In the first faculty of 1850, there sat Horace Green, Professor of Theory and Practice; Abram L. Cox, of Surgery; Edwin Hamilton Davis, of Materia Medica and Therapeutics; B. Fordyce Barker, of Midwifery and the Diseases of Women and Children; and K. Ogden Doremus, of Chemistry and Toxicology. In 1851, John Murray Carnochan took the place of Dr. Cox, and Edward R. Peaslee the chair of Physiology, Pathology, and Microscopy. In 1852, two additional chairs were created: that of Medical Jurisprudence, occupied by Judge Joel Parker of Boston, and that of Dental Pathology and Surgery, for Dr. C. C. Allen. This was the first dental chair in an American medical school. Very few changes took place after that. H. G. Cox was elected Professor of Theory and Practice in 1855; Timothy Childs, Professor of Anatomy in 1856; Austin Flint, Jr., Professor of Physiology and Pathology in 1859. I have mentioned here only such men as before and since their appointment have made a name for themselves and have played a prominent rôle in American medicine.

In 1860 Southern students began their exodus from New York. The New York Medical College was not persona grata with the South nor with the other New York schools. These had not mended their ways during the whole decade of the existence of the New York Medical College; and the majority of the faculty of the college became discouraged.

A new faculty was appointed April

21, 1860. In it were Doremus and Carnochan of the former faculty, I. Meredith Reese, A. K. Gardner, B. I. Raphael, John O. Bronson, Charles A. Budd, Bern L. Budd, R. K. Brown, and A. Jacobi. Two thoroughly new departments were created. Toxicology was taught independently of chemistry by Bern L. Budd, and the position of Teacher of the Diseases of Children was made a full professorship. It has taken Harvard twenty-eight years, and Columbia forty years to follow the example of the struggling little school in East Thirteenth Street. In Columbia even the great names of Otis and Agnew were permitted to add to, or in part to make, the renown of the school as mere "clinicals" until their death. The "seven", that sacred close corporation, willed it so. Both in Harvard and Columbia the Diseases of Children are now, however, taught by full professors. Rotch must not be forgotten by either Harvard or America, and Holt's acknowledged high rank in his profession and specialty will always be remembered.

During the years 1861 and 1863 a few names were added, some of which were those of then, or afterwards, famous men. These were Noeggerath, S. R. Percy, Frederic Holcombe, and David S. Conant. Of all the men whose names I have mentioned only one is alive to-day—myself. I doubt not, or hope that many, aye most, of the names called up before you are well known to you. Still in these days our historical interest in things and men gone by, is not well developed, as yet—neither in the history of science nor of the country. That is why we meet with so much immaturity in both scientific and political life, and why there is so much waste of industry and of energy in rediscovering facts that could easily be gathered from our own or foreign literature. Still, names like Green, Barker, Peaslee, Doremus, Flint, and Carnochan stand out like so many illuminating lights on the battlefields of American scientific labors.

Horace Green of Vermont died in 1867 at Sing Sing, at the age of sixty-five years. He taught medicine in Castleton for several years, and in 1850 was one of the founders of the New York Medical College in East Thirteenth Street. There he taught until 1860. When the reorganization took place, he remained in the faculty as emeritus. It was through his presence in the faculty that I made his acquaintance and enjoyed his confidence. He settled in New York in 1835. As early as 1846 he published a treatise on "Diseases of the Air Passages"; in 1849, his "Pathology and Treatment of Croup"; in 1852, the "Surgical Treatment of Polypi of the Larynx, and Œdema of the Glottis". These books were followed by a few others, mainly one on "Pulmonary Tuberculosis" in 1864, and a number of articles in journals. They might be studied to advantage by those who, because they are only half as old as his books and unacquainted with them, prefer to rediscover part of what was then known. His studies taught him that the larynx was accessible, and this accessibility made him catheterize that organ. His skill was such as to tempt him to make laryngeal and sublaryngeal applications with nitrate of silver and other substances, for croup and tuberculosis of the lungs. In the New York Academy of Medicine he was bitterly attacked. The great men of those days proved to their full satisfaction that the thing could not be done. Still, he exhibited his instruments and did it. But the overwhelming vote was that it could not be done. Meanwhile, I had the privilege of seeing him do his resection of tonsils and his catheterization of the larynx in his own office. I was shy and bashful, and averse to raising my voice, but the treatment of Horace Green, of whom the profession in America had every reason to be proud, was one of the things that made me compare his fate with that of Bouchut of Paris who was the first intubator of the larynx in croup. The latter was unfortunate

enough to exaggerate his results; that was why his adversaries in the Paris Academy of Medicine—the great Trousseau among them—succeeded in postponing intubation until our own O'Dwyer, without any knowledge of what had been accomplished twenty-five years earlier, rediscovered and improved upon Bouchut's manipulation. It was altogether an unfortunate time for great discoveries. Bouchut was not appreciated; Horace Green was suppressed. For instance, you also know that Holmes was ridiculed by Meigs and Hodge; and Semmelweis was driven into a lunatic asylum by Braun and Scanzoni.

Fordyce Barker was born on May 2, 1817, in Maine, practiced in Norwich, Conn., graduated in Paris, France, in 1844, and was Professor of Midwifery in Bowdoin in 1845 and in New York Medical College in 1850. His principal book is one on puerperal diseases. He died in 1886.

John Murray Carnochan was born in Savannah, Ga., July 4, 1817, and died in New York October 28, 1887. He studied six years in Paris. In 1850 he was placed in charge of the newly established hospital for immigrants on Ward's Island, and added to the surgical literature of the femur and many other subjects.

Edward Randolph Peaslee was born in New Hampshire January 22, 1814, and died in New York on January 12, 1878. He graduated from Yale in 1840, continued his studies in London and Paris, and became professor in Dartmouth College in 1841. He published "Human Histology in its Relations to Descriptive Anatomy, Physiology, and Pathology" in 1857, the first systematic book on that subject in English; a complete monograph on ovariectomy in 1865; "Statistics of Ovariectomy for the Years 1860-61, '62 and '63, Including 150 Cases"; "Retroflexion

of the Unimpregnated Uterus" in 1865 and 1866; and in 1872 "The History of Ovariectomy in This Country" and "Sketch of Dr. E. McDowell's Life". While a Professor in the New York Medical College and during his co-editorship of the *American Medical Monthly*, he published a number of his lectures and reports. He was one of the most erudite men in the American profession.

Austin Flint, Jr., was born March 28, 1836, in Northampton, Mass., and died in New York in 1915. He began the study of medicine at Louisville in 1856, and graduated from Jefferson in 1857. At an early date he began physiology as a special study, experimented in and wrote on that branch of medicine in Paris under Robin. In 1859 he taught in the New York Medical College, in 1860 at New Orleans, and in 1863 in the Bellevue Hospital Medical College, with which he remained in the same capacity for many years until he changed his position into that of a consultant in medicine and finally in psychiatry. Most of his literary work remained physiological; the study of the liver occupied much of his attention, and his extensive text-book of physiology in five volumes—the last of which appeared in 1874—first familiarized the profession with his work.

This may suffice. What I want to impress upon you is the knowledge of the fact that one of our small medical schools, the New York Medical College, was a principal cause of our national medical progress. This was to a great extent caused by the initiative in and the gradual taste for bedside instruction in practical medicine. British and American medicine has always been founded upon its practice, and the nation's health and felicity is the outcome of the people's sanitation based upon the labors and energy and successes of its doctors.

STUDIES IN PALEOPATHOLOGY

I. GENERAL CONSIDERATION OF THE EVIDENCES OF PATHOLOGICAL CONDITIONS FOUND AMONG FOSSIL ANIMALS

By ROY L. MOODIE, PH.D.

Department of Anatomy, College of Medicine, University of Illinois
CHICAGO, ILLINOIS

DEFINITION AND SCOPE OF PALEOPATHOLOGY

THE study of the evidences of disease among ancient man and fossil animals is known as *paleopathology*, the term having first been applied by Sir Marc Armand Ruffer¹ in 1914² to methods he had developed in studying the pathological anatomy of the ancient Egyptian mummies. He defined it as follows:

"Paleopathology is the science of the diseases which can be demonstrated in human and animal remains of ancient times."

The significance of the term has been dwelt upon by Klebs,³ and a further extension of its meaning to include, not only the diseases of the ancient Egyptians but those of prehistoric man and fossil animals as well, has been suggested by the writer.⁴ The field thus involved includes the resources of anthropology and paleontology, as well as some details contained in archeological studies.

¹ Sir Marc Armand Ruffer, distinguished for his work in preventive medicine and for his studies on the pathology of the Egyptian mummies, lost his life while engaged in Red Cross work. See: "Memorial Notice of Sir Marc Armand Ruffer," by F. H. Garrison, *Ann. Med. History*, 1917, vol. i, No. 2, pp. 218-220, with portrait.

² Ruffer: "Studies in Palæopathology in Egypt," *J. Path. & Bacteriol.* 1914, vol. 18, p. 149.

³ Klebs: *Johns Hopkins Hosp. Bull.* 1917, vol. 28, pp. 261-266.

⁴ Moodie: *Am. J. Sc.* 1916, vol. 41, pp. 530-531; *Science*, N. S. 1916, vol. xliii, p. 425.

⁵ The term *prehistoric*, of course, usually refers to events prior to the details of recorded human history, and is variously designated according to

The present paper deals mainly with the so-called prehistoric,⁵ and especially pre-human, evidences of disease (prior to 500,000 B.C.) of the extinct vertebrates. It is interesting to note that the history of disease, from the first geological evidences at present obtainable down to the historical data contained in August Hirsch's "Handbook of Geographical and Historical Pathology" (circa 600 B.C. to 1875 A.D.), will be seen as a series of consecutive events from the introduction of diseased conditions among animals and plants down to the present time. There can be no doubt that many of the diseases existing today are of very great antiquity, having a history extending back into geological time for many millions of years.

It is not necessary nor pertinent to review in this place the studies of Ruffer, Elliot Smith, Wood Jones, Rietti, Fouquet and other writers on the pathological anatomy of the ancient Egyptian mummies, since their results are so readily accessible. Their

the region under discussion. Thus in Egypt any grave earlier than the time of the first dynasty is often called prehistoric. This implies an age of 6,000 years or more. In France LeBaron defines the prehistoric period as closing at about 222 B.C., and several centuries later in Algeria. To the paleontologist the term is meaningless. Klebs has said: "The adjective 'prehistoric,' used so often, would seem a misnomer, because the distinction of a history read in written records from one seen and studied in equally characteristic objects, chronologically determinable, is purely arbitrary and artificial and it would do no harm to drop it altogether."

material might be regarded, from a certain standpoint, as *fossil*, meaning something "dug up." The term *fossil*, however, as used in this paper refers to material which is thoroughly petrified, the age of which must be reckoned by geological standards. The studies of the above-mentioned writers have been briefly reviewed and summarized by Garrison,⁶ Klebs,⁷ and Sudhoff,⁸ and will be extensively referred to elsewhere by the writer.

The studies of Aleš Hrdlička and Langdon⁹ on the pathological anatomy of the North American Indians, and of Hrdlička, Eaton¹⁰ and other writers on the ancient Peruvians, must also be neglected, as well as the meager details of fossil man as they are recounted in the various works on anthropology. The subject of the diseases of ancient human races has never been systematically studied. The writer will present a consideration of this subject at some future time.

PALEONTOLOGICAL EVIDENCES OF DISEASE

The study of paleopathology is still in its initial stages, and especially is the application of pathological methods to fossil lesions a new field. But the comparative scantiness of facts so far brought out and the difficulties of research should not hinder its successful prosecution. What the final results may be remains to be seen. The immediate results are certain to bring attention to the presence of characteristic lesions of disease far back in geological time, and it is very interesting, if not important, to find in past geological ages evidences of

pathological processes which are so familiar to us today. If we can trace the known lesions to any definite cause among the extinct animals it will be a step toward the erection of the newest branch of pathology, dealing with the oldest aspects of that science.

In regard to the importance of this branch of study, Klebs¹¹ says:

"We need only consider what definite influence diseases exert in our individual lives, what profound social upheavals were brought about through the incidence of epidemics, less perceptibly perhaps but none the less strongly, through widespread chronic ailments, through professional diseases, how whole districts and countries are forsaken because disease made them uninhabitable, how disease affecting early childhood and others producing sterility led to the gradual extinction of whole peoples. . . . For the grasp of such problems, the study of disease as it appears to us now does not suffice; the traces left during immense periods of time have to be taken into account and it is in just such questions, not approachable by other methods, that paleopathology in time to come may furnish important solutions."

The attitude of students of paleontology toward this subject has been negative. Even men like Leidy, a trained anatomist and an eminent medical man, paid scant attention to the subject, although he did describe an example of *caries* in a mastodon tooth¹² from Florida. Cuvier too, eminent as he was in the field of comparative anatomy, failed to recognize the importance of this phase

⁶ Garrison: "History of Medicine," 1917, 2nd ed., p. 50; *Ann. Med. History*, 1917, vol. 1, No. 2, p. 219.

⁷ Klebs: *Johns Hopkins Hosp. Bull.* 1917, vol. 28, pp. 261-266.

⁸ Sudhoff: J. L. Pagel's "Einführung in die Geschichte der Medizin," p. 33.

⁹ Langdon: "The Madisonville Prehistoric Cemetery. Anthropological Notes," *J. Cincin. Soc. Nat. Hist.* 1880, vol. iii, p. 40; 1881, vol. iv, p. 250,

Figs. 1-22. Good discussion of pathology of early North American Indians.

¹⁰ Eaton: "The Collection of Osteological Material from Machu Picchu," *Mem. Connect. Acad. Arts & Sc.* May, 1916, vol. v.

¹¹ Klebs: *Johns Hopkins Hosp. Bull.*, 1917, vol. 28, pp. 261-266.

¹² Leidy: *Proc. Acad. Nat. Sc.*, Philadelphia, 1886, p. 38.

of paleontology. His discussions of the few lesions he recognized were meager and inadequate. He has described a fractured skull of a Pleistocene *Hyæna* and a fractured femur of *Anoplotberium*.

Paleontology lends considerable light to the study of the antiquity of disease. The study of the lesions so far known among fossil animals indicates nothing new in the nature of pathological processes but simply extends our knowledge of disease to a vastly earlier period than had previously been known. It seems quite probable that some of the diseases exhibited by the extinct vertebrates went out of existence with the race of animals which were afflicted. If this proves to be true it will be an interesting opportunity to study the details of lesions of extinct diseases. There seems to be little possibility of determining the fundamental cause of disease other than is already known; for disease is apparently one of the manifestations of life, and has followed the same lines of evolution as have plants and animals, and is possibly directed by the same factors. Such a study as the present may, however, throw light on the origin of many of the diseases to which the human race is a prey. A knowledge of the pathological processes which have taken place in animals of geological antiquity will aid in an understanding of the general nature of disease.

The literature of vertebrate paleontology contains a number of incidental references to the diseased nature of the fossilized bones of fishes, reptiles, birds, and mammals, the lesions described indicating a variety of diseases, some of which are not uncommon today. It is manifestly impossible to diagnose correctly, on the basis of our modern

knowledge of recent diseases, all of the lesions which are preserved in a fossil condition. In the extinction of the ancient races of animals, certain diseases, without doubt, became extinct with them,¹³ and it is partly the purpose of this paper to inaugurate an inquiry into the nature of the diseases of fossil vertebrates. No one has yet made a study of the evidences of disease among fossil animals, since these conditions, whenever noted, have been referred to only in an incidental way, by writers on paleontological subjects.

Geological evidences of the diseased state of animals are necessarily restricted to pathological lesions on the hard parts of fossil animal remains. Soft parts¹⁴ are seldom fossilized, and the few specimens known have not been subject to disease. Since the pathological changes which affect the hard parts of animals today are relatively few when compared to the diseases which afflict the body as a whole, it is to be supposed that the paleontological evidences of disease are but partial indications of the prevalence of pathological conditions in geological time. The following account, too, must be read in the light of the paucity of evidence available for discussion. The details are meager, but since they are all we have, they may be deemed worthy of consideration.

It will be clearly evident, after a consideration of geological matters, that all paleontological evidence is of relative value, since such small portions of the ancient faunas and flora are preserved in the rocks. However, we are safe in stating, from such evidence as we have, the probabilities of the occurrence of numerous diseases among extinct animals, just as it is safe for us to state, on the basis of a single tooth in a of Kansas, with a Review of Other Fossil Brains," *J. Comp. Neurol.*, April, 1915, vol. 25, No. 2, where an annotated bibliography of fifty papers will enable the interested reader to see just how meager is our knowledge of the soft parts of extinct vertebrates. Many of the softer structures are represented by impressions on the stone.

¹³ Among diseases which have become extinct within historical times may be mentioned the *sweating sickness* described by Hecker in "Epidemics of the Middle Ages," 1846, pp. 181-353.

¹⁴ The soft parts of fossil vertebrates have been discussed by a number of writers. Our knowledge of the entire subject is reviewed in the author's paper, "A New Fish Brain from the Carboniferous

definite geological horizon, that such and such an animal existed at the time the formation was being deposited, provided, of course, the deposit is a primary one and the fossil was not moved by shifting in a secondary deposition.

All that we know of the earliest land vertebrates, prior to the Pennsylvanian, for instance, is a single footprint from the Devonian, and a few series of footprints from the Mississippian. On the basis of these footprints we are able to say definitely that there existed in North America a diversified fauna of vertebrates, probably amphibian, which preceded the well-known amphibian faunas of the great Coal Period.

DEFINITION OF DISEASE AS USED IN THIS STUDY

Disease, as the term is used in this study, may be defined as any deviation from the healthy or normal state of the body which has left a visible impress upon the fossilized skeleton. The evidence may take the form of broken bones, tumors, necroses, hyperplasias and arthritides of various kinds. Only the diseases of animals have been considered. This is done with a full realization of the enormous domain of phytopathology and is a confession of a limitation to a restricted field. Some of the paleobotanical literature has been read, but apparently no attempt has been made to trace the rise and progress of phytopathology from fossil material.

This is doubtless due to the unsatisfactory condition of fossil plant material which is usually quite fragmentary. Some idea of the nature of plant diseases of the past may be had from the following brief summary¹⁵ for which I am indebted to Professor Edward W. Berry:

"Bacterial and fungus activity are known in Carboniferous plants, and would

probably be detectable at much earlier horizons if petrified material of greater age were available for study, since the bacteria appear to be among the earliest forms of life. Material preserved as impressions at all horizons, more especially the post-Paleozoic ones, show abundant leaf-spot fungi, and such remains from the Cretaceous and Tertiary show abundant insect galls and leaf cutting by caterpillars or bees; but this class of material is usually more or less indefinite. Whenever one handles much petrified material, one is struck with traces of fungal ravages and bacterial action."

EVIDENCES OF DISEASE IN FOSSIL PLANTS

It is often difficult to decide whether the ravages of fungi and bacteria are pre- or post-mortem. The agents of decay are well known to have existed early in geological time. During the Carboniferous there existed conditions which were especially favorable to the growth of a mycological flora, and much of it was probably on dead plant material.

Professor Berry writes further¹⁶ concerning the primitive fungi:

"Among the relics of former vegetation that carry the record back many millions of years the remains of fungi are so rarely found that their presence is always exceptional, although it is obvious that many times during the long history of the earth the environment has offered optimum conditions for their abundant development. To mention but one such occasion, that of the formation of the Coal Measures must have witnessed an exceedingly abundant mycological flora. That these plants were present thus early is indicated by the abundance of hyphæ, and other traces of fungal activity such as butyric fermentation, in the tissues of

¹⁵ Berry: Letter to author, Jan. 4, 1918.

¹⁶ Berry: "Remarkable Fossil Fungi," *Mycologia*,

1916, vol. 8, No. 2, pp. 73-78, plates 180-182, containing 16 figures.

Carboniferous vascular plants, and the scarcity of described forms must be attributed to the perishable nature of most fungal tissues and to the lack of systematic work by experienced mycologists on the more or less obscure material available. To be sure, quite a considerable number of fossil forms referred to Fungi have been recorded from various geologic horizons but the vast majority of these are leaf-spot types based upon real or fancied resemblances, and found on impressions of foliage and without definite botanical characters. Some doubtless represent fungal ravages, others are due to insects, some are glandular, and others are purely imaginary."

Professor Berry refers to A. Meschinelli's "Fungorum Fossilium Omnium Iconographia," (1902, 144 pp., 31 plates), for a rather complete illustrated list of all of the forms referred to down to the year 1900. Other and more complete studies on the bacteria and fungi of the Coal Measures of France particularly have been made by Van Tieghem and Renault. A fairly complete list of their numerous papers is to be found in Smith's bibliography.¹⁷ Other information may be gleaned from the memoirs and textbooks dealing with Paleobotany.

¹⁷ Erwin F. Smith: "Bacteria in Prehistoric Times." In "Bacteria in Relation to Plant Diseases," 1905, vol. 1, p. 262.

¹⁸ The question of extinction is still one of the unsolved problems of paleontology. The importance of those diseases which leave an impress on the skeleton has been referred to by the author in the following words:

"It is not my intention to contend that disease has not been influential in the extinction of races (or species); it probably has been; but those diseases which have left an impress on the fossilized skeleton certainly cannot be regarded as among those diseases which would produce widespread extinction. Some other has been the dominant factor. The present results of the study of fossil pathology indicate the early appearance in geological time and widespread distribution of diseases of many

METCHNIKOFF ON DISEASES IN REMOTE EPOCHS

The possible presence of disease among animals of remote epochs of the earth's history was suggested by Élie Metchnikoff in the following words:

"Diseases in general and infective diseases in particular were developed on the earth at a very remote epoch. Far from being peculiar to man, animals and the higher plants, they attack inferior forms and are widely distributed among unicellular organism, Infusoria and Algæ. Diseases undoubtedly play an important rôle in the history of life on our planet, and it is very probable that they have contributed in a marked degree to the extinction of certain species.¹⁸ When we observe the ravages produced by parasitic Fungi among the young fish which we are trying to rear, or the destruction of cray-fish in certain countries in consequence of the rapid increase of epizootic germs, we are involuntarily led to the conclusion that pathogenic micro-organisms must have brought about the disappearance of certain animal and vegetable species."¹⁹

It would be interesting in this connection to know Metchnikoff's sources of information relative to the presence of diseases at remote epochs. Virchow's studies on the

kinds, but none of them, so far as the fossil lesions may be interpreted, were sufficiently severe to have played a part in the extinction of any of the known groups of fossil vertebrates. They are to be regarded rather as chronic infectious or constitutional diseases which may have played a part in extinction, but there must have been some other and more powerful ally which is at present unknown." ("The Influence of Disease in the Extinction of Races," *Science*, N. S., Jan. 19, 1917, vol. xlv., No. 1151, pp. 63-64.

¹⁹ Élie Metchnikoff: "Immunity in Infective Diseases," 1915. Translated from the French by Francis G. Binnie, p. 8.

cave bears of Europe²⁰ were well known, and his characterization of the arthritic lesions of the fossorial animals as the "Höhlengicht," was certainly famous at the time Metchnikoff wrote. The studies of Mayer²¹ on the lesions of the cave bears and cave lions of Europe as well as the writings of Cuvier (1820), Esper (1774), Goldfuss (1810), Walther (1825), Schmerling (1835), Owen (1842), Schaafhausen (1858), Newton and Parker (1870), Graff (1885) and Leidy (1886) may, any or all of them, have been known to Metchnikoff. They all suggest the pathology of ancient times and some deal entirely with the pathological anatomy of fossil remains. None, however, are studies which deal with remains older than the middle Tertiary, and to a paleontologist the term "remote epoch" hardly applies, when compared to lesions known from the Carboniferous, for example. I am, therefore, forced to conclude that Metchnikoff simply forecasted what would be discovered, on the basis of what he knew in modern plants and animals. All of the literature in paleontology dealing with pathological evidences of any great antiquity, prior to the mid-Tertiary, has appeared since 1900. The literature is meager and unsatisfactory. Paleontological studies seldom deal specifically with diseased conditions, so that the field is still to be explored. The studies in paleontology dealing with pathological evidences among fossil vertebrates have been reviewed by

Abel,²² and a much fuller review is planned for a memoir on paleopathology, now in preparation.

APPARENT ABSENCE OF DISEASE AMONG EARLY PALEOZOIC ANIMALS

A careful study of the literature of paleontology shows that, so far as present observations are concerned, the animals of the earlier periods of the earth's history were free from disease. Although bacteria²³ are known to have occurred in the algal deposits of the Newland limestone, a formation of the Beltian series of Algonkian rocks in central Montana, they are not known to have been of a pathogenic nature, but rather are supposed to have been active in the deposition of limestones, together with the algæ with which they were associated. No lesions due to accident or to infection have been described among either the vertebrates or invertebrates of the early geological periods, prior to the Carboniferous. This lack of knowledge concerning the evidence of disease may be due to ignorance on our part, for the lesions may have been seen but were not deemed worthy of description. Or, it may be due to the fact that the invertebrates of the Proterozoic and Paleozoic, which were the predominant types of animal life during these periods, were free from disease which affected the skeleton, as are, in general, the invertebrates of today, although many of the

²⁰ Rudolf Virchow: "Ueber einen Besuch der west-fällischen Knochenhöhle," *Ztschr. f. Ethnol.* 1870, Bd. 2, p. 365, footnote; "Knochen vom Höhlenbären mit krankhaften Veränderungen," *Ibid.*, 1895, Bd. 27, pp. 706-708, figs. 1-4; "Beitrag zur Geschichte der Lues," *Dermat. Ztschr.*, 1896, Bd. 3, p. 4.

²¹ Mayer: "Ueber krankhafte Knochen vorweltlicher Thiere. In "Nova Acta Leopoldina (Novorum Actorum Academia Cæsareæ Leopoldino-Carolinæ Naturæ Curiosum)," Bd. xxiv, pt. II, pp. 673-689, pl. 30.

²² O. Abel: "Grundzüge der Paleobiologie der

Wirbelthiere," 1912; "Spuren von Kämpfen," pp. 88-91; "Knochenerkrankungen," pp. 91-95.

²³ These bacteria are described and figured by C. D. Walcott and H. F. Osborn.

C. D. Walcott: "Discovery of Algonkian Bacteria," *Proc. Nat. Acad. Sc.*, April 1915, p. 256; "Evidences of Primitive Life," *Smithsonian Rep. for 1915*, pp. 235-255, illustrated.

H. F. Osborn: "Origin and Evolution of Life," 1917, p. 153; *Science*, N. S., 1917, vol. 46, No. 1192, pp. 432-434.

Their discovery was forecasted by Walcott in his "Pre-Cambrian Algal Flora," *Smithsonian Misc. Collect.*, 1914, vol. 64, No. 2, p. 95.

recent forms are highly parasitized and are occasionally subject to disease. It appears probable that vertebrates have been more liable to diseases which afflict the hard parts than have the invertebrates, and this liability to pathologic processes has been increased with the passage of geologic time.

IMMUNITY IN MODERN INVERTEBRATES

The greater immunity of early Paleozoic animals to disease, based on the evidences of paleontological material, is probably not a true index to actual conditions, though it may be so. It is probably not safe to conclude from present-day conditions what the state of Paleozoic animals may have been as regards disease. At any rate the paleontological evidences are not wholly substantiated by conditions found in modern forms. Metchnikoff²⁴ has called attention to the occurrence of epidemics of a severe nature among protozoa, such as diseases in *Amæbæ* caused by the *Microspæra* and the disease in *Actinophrys* attributed to Fungi allied to the genus *Pythium*. Pasteur's studies on the *pébrine* and *flâcherie* of the silkworms will be remembered as instances of severe epidemics in an invertebrate group. Molluscs, however, are apparently largely immune to infection, and since the molluscan animals formed such a large percentage of the preserved faunas of the early periods of the earth's history we may attribute our ignorance of the presence of disease to this factor, in part at least. The immunity of many intermediate hosts to

infection²⁵ is well known, and the classical example of the mosquito-borne infections will suffice, although it is well known that insects of many kinds are subject to fatal diseases. Kowalevsky has discussed the anthrax of crickets and many other students have studied the problem. The entire question of immunity in its relation to all forms of extinct animals is of course a new and unsolved, probably an insolvable, problem. But it seems certain that if the early animals were diseased, the ensuing pathology was of such a nature as to leave no impress upon the fossilized part; or else we have not yet learned to recognize these lesions.

THE ORIGIN OF DISEASE

Phagocytosis²⁶ doubtless began very early in the history of animal life, and it is probable that the natural immunity of the early animals was sufficiently strong to resist the invasion by any pathogenic organisms in sufficient numbers to produce disease. The breaking down of this immunity may possibly be correlated with the development of senescence²⁷ among the early races of animals, which reached a climax in some forms—the trilobites, for instance,—at about the time when we find the first indications of disease among fossil animals. The breaking down of the immunity, due to the development of race senescence and the introduction of disease, doubtless was of very great importance in the extinction of the trilobites and other great groups

²⁴ Metchnikoff: "Immunity in Infective Diseases," translated from the French by Francis G. Binnie, 1905, p. 18; also Chap. iii.

²⁵ Edward Hindle: "Flies in Relation to Disease (Blood sucking Flies)," 1914.

G. S. Graham-Smith: "Flies in Relation to Disease (Non-Blood sucking Flies)," 1914.

²⁶ Elias Metchnikoff: "Die Lehre von den Phagocyten und deren experimentelle Grundlagen." In "Kolle und Wassermann's Handbuch der pathogenen Mikroorganismen," 1913, Bd. ii, erste Hälfte, pp. 655-731, with an excellent bibliography.

²⁷ The studies of Charles Emerson Beecher (1856-1904), an American paleontologist, upon evolutionary phases of the early fossil brachiopods and trilobites are especially important to consider in connection with the question of race senescence and the extinction of animal groups. His papers have been collected into a volume: "Studies in Evolution," New York, 1901.

The entire subject of senescence in the recent lower animals is discussed by Child in "Senescence and Rejuvenescence," University of Chicago Press, 1915.

of animals which have disappeared from the earth.²⁸

I do not intend to assert that senility or senescence is a disease, but that age weakens the organism and the race and allows the ingress of disease. Minot has stated:

"Old age is not a disease and cannot be cured; it is an accumulation of changes which begin during earliest youth and continue throughout the entire life of the individual."

It may be said that disease in the past has often attacked the races of animals which showed senescence. Many of the virile races of animals in the past were also subject to disease. The paleontological indications of senescence are the reduction in size, the loss of vigor and the production of apparently useless spines as seen in the races of animals which have become reduced or extinct, such as the crinoids, trilobites, brachiopods, ammonites and the dinosaurs. Other examples of senescence may be seen among some of the Permian reptiles which assumed bizarre forms. The tendency of many races of animals to acquire spinous and other useless excrescences of the hard parts shortly before the extinction of the group is noteworthy, and this tendency has been regarded by paleontologists as an indication of senescence.

LESIONS OF PARASITISM IN CARBONIFEROUS CRINOIDS

Our knowledge of the history of disease, as it is based on paleontological evidence, begins with the Carboniferous, when cer-

tain crinoids were afflicted in their stems with tumor-like lesions, possibly due to the parasitic action of myzostomids such as commonly attack crinoid stems today. A careful description of the enlarged stems of recent crinoids and the parasitic action of the myzostomids is to be found in the reports of the Challenger Exploring Expedition. A comparison of the ancient and recent lesions on the stems of crinoids leads one to accept the enlargements of fossil crinoid stems as due to the parasitic action of the myzostomids or some similar form.

The evidences for such a conclusion are, apparently, incontrovertible, and have been established by a number of writers on fossil crinoids. Parasitized crinoid stems are known from the Carboniferous of Scotland, Germany (Fig. 1) and the Keokuk beds (Fig. 4) of North America. Graff²⁹ found the carbonized remains of the parasite in one of the enlargements (Fig. 2) which he studied and which he referred to as the fossilized integument of the myzostomid. The presence of this soft-bodied animal so early in the geological history of the world is not surprising, since from the researches of Walcott³⁰ we know that jellyfishes, sea cucumbers, many types of annulates, and soft-bodied crustaceans lived during the Cambrian, many millions of years earlier. The parasitism of animals during the Carboniferous was preceded by partial parasitism or commensalism of the earlier periods, and is known to have occurred among fossil corals (Fig. 3) of the Devonian. The intimate association of animals and the origin of parasitism and commensalism during the early part of the Paleozoic has been studied by Clarke.³¹ The reader is referred to his paper for further details.

²⁸ This suggestion has been discussed by René Larger in his paper "La contre-évolution ou dégénérescence par l'hérédité pathologique cause naturelle de l'extinction des groupes animaux. Essai de paléopathologie générale comparée," 1916, *Bull. et mèm. Soc. d'anthrop. de Par.*

²⁹ Graff: "Paleontographica," 1885, Bd. 31, pp. 183-192, Taf. xvi.

³⁰ C. D. Walcott: "Evidences of Primitive Life," *Smithsonian Rep. for 1915*, pp. 235-255, with plates.

³¹ John M. Clarke: "The Beginnings of Dependent Life," *Fourth Ann. Rep., Director of Science Div., New York State Education Dept.*, 1908, pp. 1-28. Pl. 1-13.

The remains of the early vertebrates prior to the Permian have shown no noteworthy pathological lesions. There may

laterally compressed fishes preserved in the attitude of the opisthotonos and pleurothotonos in horizons prior to the Permian. These attitudes may have been due to spastic distress induced by cerebrospinal infections or to some form of poisoning. Since this subject will be more fully treated elsewhere nothing more need be said than that these attitudes possibly represent diseased conditions of the central nervous system.

PATHOLOGY OF THE PERMIAN VERTEBRATES

Several pathological conditions are indicated among the vertebrates of the Permian. Renault³² has described *caries* of certain fish bones preserved in coprolites from the Autun basin. He concludes that this type of caries is due to several types of bacteria which he has described and figured. A left radius of *Dimetrodon*, a primitive reptile, from the Permian of Texas shows an incompletely healed fracture (Fig. 5) with abundant osteosclerosis and some intermediary callus. This is the oldest known case of fracture. It was a simple fracture cutting the bone at right angles, and the healing process has taken place with very little shortening. The bone has no medullary cavity, so that attempts to study the nature of the fracture by means of the x-ray have been a failure. The Texas red beds, from which the bone comes, are impregnated with iron, and the radius reacts to the x-rays much as a bar of iron would. A fractured rib with an old callus is also known from the Permian of Texas. A description of this lesion with illustrations is to be found in *The Surgical Clinics of Chicago*, April, 1918. Von Huene has described the skull of a phytosaur from the Triassic of Germany, showing a fractured snout with many necrotic sinuses.

³² B. Renault: "Microorganismes des combustibles fossiles," *Bull. Soc. de l'Industrie minière à Saint-Etienne*, 1899-1900, Ser. III, with atlas of plates.

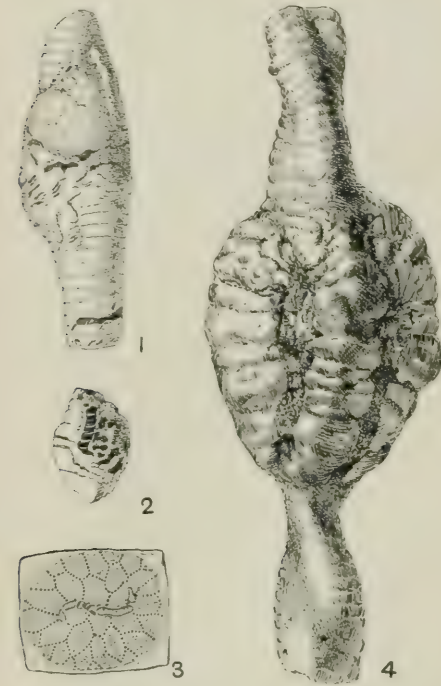


FIG. 1. Parasitized stem of a crinoid, from the Carboniferous of Germany, showing the tumor-like mass produced by the action of the myzostomid. (After Graff.)

FIG. 2. Portion of parasitized crinoid stem, showing carbonized remains of the myzostomid. (After Graff.)

FIG. 3. Section through a fossil coral, *Pleurodictyum problematicum* from the Lower Devonian of Eifel, showing the worm tube near the center. An example of ancient commensalism. (After Stromer von Reichenbach.)

FIG. 4. An enlarged stem of a crinoid from the Keokuk beds of North America, showing that the enlargement has involved the plates of the stem. This specimen was thoroughly mineralized into a geode, so that no evidences of the parasite were seen. One-half natural size.

have been diseases among these early forms, but the lesions have not yet been discovered. We find, to be sure, certain

DISCUSSION OF GRAPH SHOWING INCREASE
OF DISEASE IN GEOLOGICAL TIME

It is not necessary at this time to go into further details concerning the progress of disease, since the details are to be given in a later paper. The accompanying graph (Fig. 6) will show how, according to present evidences, disease has progressed during the geological history of the earth. The twenty-five divisions on the base line a-d (Fig. 6) represent as many periods of the earth's history. The divisions on the vertical line d-b represent the approximate number of diseases present in each period, as indicated by the known fossil lesions. The time intervals in the graph are shown as of equal value, but the geological periods are not at all of equal duration nor of equal character. This should be kept in mind in studying the graph.

At the point "a" we may say that organic life is first known. It will be seen that the line "a-b," representing the history of disease, follows a base level for the first twelve periods of the earth's history. Then the

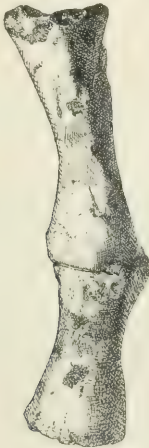


FIG. 5. Callus and fracture in left radius of *Dimetrodon*, a reptile from the Permian of Texas. The specimen belongs to the Paleontological Collections in Walker Museum, University of Chicago. One-half natural size.

curve gradually rises until, during the Cretaceous, at "c," diseases and accidents—such as caries, osteoperiostitis, deforming arthritides, necroses, hyperostosis, oste-

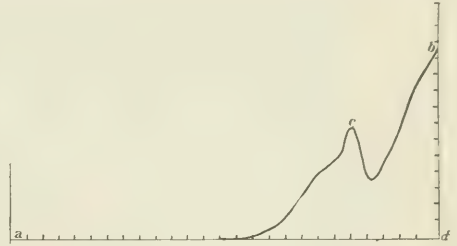


FIG. 6. Graph showing increase of disease in geological time. The divisions on the base line, a-d, represent geological periods, and on the vertical line prevalence of pathological conditions.

ophytes, osteomata, fractures—and many infective processes, reached a maximum of development among the dinosaurs, mosasaurs, crocodiles, plesiosaurs, and turtles. The curve suddenly and sharply descends from "c." For with the close of the Cretaceous and the sudden extinction of large groups of the giant reptiles, the incidence of disease also decreased. It seems quite probable that many of the diseases which afflicted the dinosaurs and their associates became extinct with them.

The mammals of the Cretaceous and early Tertiary periods (Fig. 7) do not seem to have been so generally afflicted with disease as were the preceding groups of giant reptiles, nor as were the later mammals. The ascending curve therefore is not so abrupt as one might expect. Certain processes of disease seem to have been acquired by the mammals from preceding forms, for caries and other primitive diseases are evident (Fig. 8) among early Tertiary mammals. The curve rises rapidly, however, and reaches the highest point at "b," indicating that disease is much more prevalent at the present time than ever before in the history of the world.

The geological development of disease has certain curious characteristics which parallel facts in the evolution of animals and plants. Huxley many years ago called attention

geological antiquity a few can certainly be called persistent or primitive types which have remained the same since the close of the Paleozoic. Other diseases arose and

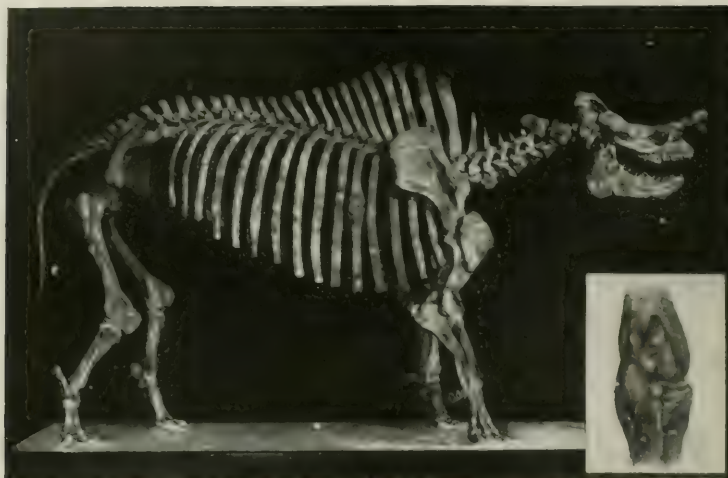


FIG. 7. The skeleton of an early Tertiary mammal, *Titanotherium robustum*, from the White River Oligocene of South Dakota, as it is mounted in the American Museum of Natural History. The fifth rib on the right side has been fractured and has healed with a pseudarthrosis and considerable callus. The details are shown in the enlarged sketch in the lower right hand corner. One-sixteenth natural size. (Courtesy of Dr. W. K. Gregory.)

to certain persistent types of animals which had existed almost unchanged from early geological periods down to the present. Among the known diseases (Figs. 9-12) of

became extinct, but some of them have retained the same characteristics, as seen in the resulting changes of structure.

According to present evidences, disease

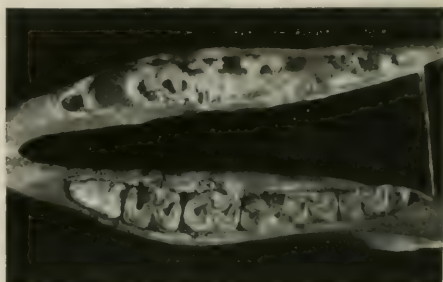


FIG. 8. Two views of the mandible of a three-toed horse, *Merychippus campestris*, from the Miocene, about one and one-half million years old. The figures show in the absorbed alveolar margins pathological processes similar to alveolar pyorrhea of the present day. A left premolar shows evidences of caries, and the swelling in the left ramus, so evident in the right-hand figure, is indicative of a fistula, possibly indicating the presence of *actinomycosis* in the early stages. (Courtesy of Dr. W. D. Mathew)

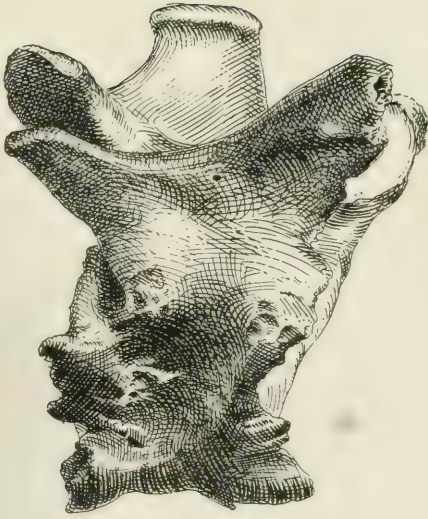


FIG. 9. Lateral view of a dorsal vertebra of a saber-toothed cat, *Smilodon*, from the Rancho la Brea asphalt beds, Pleistocene, of California, showing the characteristic lesions of spondylitis deformans. Natural size. About 500,000 years old.

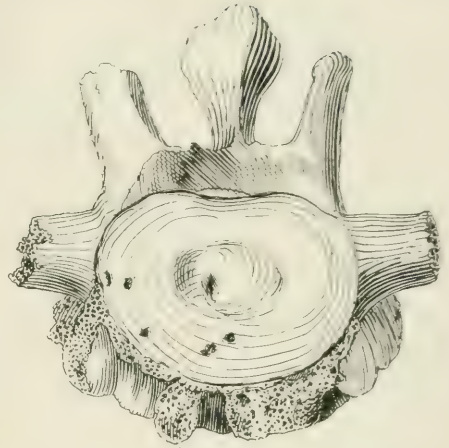


FIG. 10. Posterior view of a dorsal vertebra of a cave bear, *Ursus spelæus*, from Europe, showing characteristic lesions of spondylitis deformans. Natural size. About 250,000 years old. (After Mayer.)



FIG. 11. Spondylitis in the lumbar vertebra of an ancient Egyptian. About 5,000 years old. (After Ruffer.)



FIG. 12. Spondylitis deformans in a recent human vertebra. Natural size.

These four figures show the characteristic lesions of this osteoarthritis at different periods of the history of animals and man. So far as external appearances go there has been no change in the pathological processes producing these lesions since the Pleistocene at least. Similar lesions of greater antiquity have not yet been seen.

is, from the geological standpoint, of relatively recent origin and has afflicted the inhabitants of the earth for only the last one-quarter of the earth's history—that is, for the last 25,000,000 out of a possible



FIG. 13. The mandible of a cave bear, *Ursus spelæus*, Pleistocene of Europe, showing the ravages of disease. Caries and the absorption of alveolar processes, as well as necrotic sinuses are evident in this mandible. (After Mayer.)

100,000,000 years. Future discoveries will doubtless modify our present conceptions, but the above outline is a summary of our present knowledge of the rise and development of disease among animals.

TABULATION OF GEOLOGICAL EVIDENCES

The table given below will show at a glance the antiquity of pathological evidences in geological history. The estimates of time are based upon the relative thickness of the pre-Cambrian and post-Cambrian rocks, after Walcott and Schuchert, as given by Osborn in his "Origin and Evolution of Life."³³ The estimates of the duration of the geological periods vary greatly. The duration of the Proterozoic was as great, probably, as all post-Cambrian time, which has been estimated as high as 100,000,000 years. A study of radioactive substances gives estimates as high as 1,600,000,000 years for the duration of the Archeozoic, although Walcott estimates that only 70,000,000 years have elapsed since the beginning of sedimentation. While authors vary greatly in their estimates, they all agree that the duration of geological time has been very great, running into many millions of years. The

estimates given in the first column of the table are extremely conservative. I have followed Osborn in this column. In the second column a much greater estimate is given. The table will show the relative antiquity of various diseases, whatever values are assigned to the time estimates.

FOSSIL PATHOLOGICAL LESIONS

The following annotated list and illustrations of fossil lesions will indicate the extent of diseases among fossil vertebrates. The study of these lesions is by no means complete, and other pathological processes will doubtless be indicated as the study of them progresses.

1. **CARIES** is very common among fossil vertebrates and has been described by Renault as occurring among Permian fishes, 20,000,000 years ago. A large marine reptile, from Belgium, one of the Cretaceous mosasaurs, according to Abel, shows in the left mandibular ramus extensive evidences of the ravages of this disease. In an early Tertiary species of the three-toed horse (Fig. 8), the mandible has been affected by caries and possibly also by *actinomycosis*, as well as some necrotic process which has resulted in the exposure of the roots of the teeth and the absorption of the alveolar margins, similar to the results of *pyorrhea alveolaris*. Caries has been noted also in the tooth of a mastodon, and in the early cave bears (Fig. 13) of Europe. The early races of men were singularly free from this disease as evidenced by the fossil remains.

2. **PYORRHEA ALVEOLARIS**, or some similar pathologic process, is especially evident in the absorbed alveolar margins and in the loosened teeth of a three-toed horse (Fig. 8) from the Miocene of North America. It is also extensively indicated in the mandibles of the European cave bears (Fig. 13), and in a Cretaceous mosasaur from France.

3. **DEFORMING ARTHRITIDES** are fairly common among fossil vertebrates and indicate a variety of pathologic conditions.

³³ Osborn: "Origin and Evolution of Life," p. 153.

GEOLOGICAL EVIDENCES OF PALEOPATHOLOGY

MILLIONS OF YEARS	TIME	ERAS	GEOLOGICAL PERIODS	CHIEF ANIMAL GROUPS	EVIDENCES OF PATHOLOGY
5 10 15 20 25 30	3,000,000 to 10,000,000 years	CENOZOIC	Quaternary	Age of Man	Abundant lesions on fossil and sub-fossil human remains
			Tertiary	Age of Mammals	Numerous diseases represented on animal remains from the deposits of the period
	6,000,000 to 12,000,000 years	MESOZOIC	Cretaceous	Age of Reptiles	Lesions on the bones of mosasaurs, dinosaurs, plesiosaurs, turtles, crocodiles, phytosaurs and other reptiles representing diseases similar to the modern forms of periostitis, hemangioma, necrosis, caries, pyorrhea alveolaris, arthritides, fracture with callus, pachyostosis, osteoma, opisthotonos and other lesions which cannot be interpreted.
			Comanchian		
			Jurassic		
			Triassic		
	12,000,000 to 19,000,000 years	PALEOZOIC	Permian	Age of Amphibians	The lesions known represent dental caries, pyorrhea alveolaris, fracture, callus and parasitism. These periods witnessed the beginnings of disease. Bacteria and fungi were abundant.
			Pennsylvanian		
			Mississippian		
			Devonian	Age of Fishes	No evidences of disease are known from these periods. Beginning of dependent life.
Silurian					
Ordovician			Age of Invertebrates		
Cambrian					
31,000,000 to 50,000,000 years	PROTEROZOIC	Keweenawan	First known fossils	Bacteria (non-pathogenic)	
		Animikian			
		Huronian			
		Algoman			
		Sudburian			
45,000,000 to 1,600,000,000 years	ARCHEOZOIC	Laurentian	No life known		
		Paleolaurentian			

Arthritides are especially common in Pleistocene mammals. The most prominent case of a deformed joint is the case of two caudal vertebræ (Fig. 14) of a large dinosaur, the interarticular surfaces of which have been extensively deformed and surrounded by a huge exostosal growth.

the middle of the tumor-like mass is 38.5 cm. The lesion has involved a length of 12 cm. Its surface generally is rather deeply pitted. There is an unusual ventral growth, which is shown in its normal condition in Fig. 15 at "A." This bony process, "the chevron," which served to protect the cau-

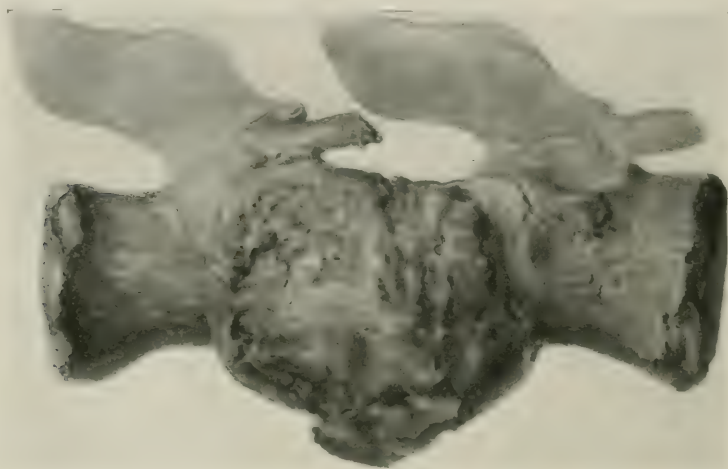


FIG. 14 Two caudal vertebræ of a sauropodous dinosaur, possibly *Apatosaurus*, exhibiting a pathological lesion which may be interpreted as a hæmangioma, as a callus, as due to osteomyelitis or some unknown cause. This is one of the most interesting evidences of disease among fossil animals so far studied. A detailed account of it will be given later. Other lesions of a similar nature are fairly common among the dinosaurs of North America and Europe. One-half natural size. The specimen is from the Como Beds, Comanchian, of Wyoming, and is the property of the Kansas University Museum of Natural History.

The mass resembles closely the tumor-like masses seen on oak trees. It entirely encircles the vertebræ and has involved fully half of the two bones. The dark line running vertically in the middle of Fig. 14 indicates the point where the normal union of the two vertebræ would occur, but all evidences of separate structures are obliterated, and the two vertebræ are fused into a single mass. The specimen has a length of 26.5 cm. and a weight of 5.1 kg. The circumference of the normal articular surface of one of the vertebræ measures 27 cm., and the same measurement around

dal vein and artery, is commonly present in the tail of these reptiles. The growth of the diseased portion is unequal and has involved more of the vertebræ on one side than on the other; likewise, the growth has attained greater lateral dimensions on one side.

The enlargement is somewhat suggestive of the lesion of chronic osteomyelitis. It may be a callous growth, possibly due to a fracture of the caudal vertebræ; or it may be a bone tumor. The character of the lesion is naturally problematic, but it is interesting that pathological growths in the

early geological periods so closely resemble the lesions of today. Section of the tumor mass shows the presence of numerous vascular spaces, so that in this respect it resembles a hæmangioma. Microscopic study of the periphery (Fig. 16) shows the presence of well-developed Haversian systems of osseous lamellæ.

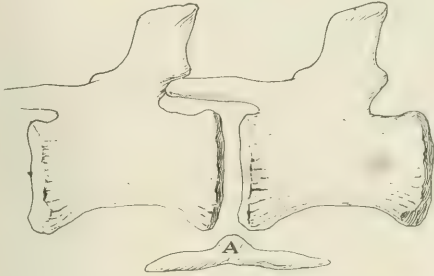


FIG. 15. Outline sketch showing normal appearance of the two vertebrae, based on *Diplodocus* and *Apatosaurus*. A=chevron. This process in the pathological specimen has been shoved far ventralward and involved in the tumor-like mass.

The bones exhibiting these interesting indications of Mesozoic pathology are the caudal vertebrae of a huge land reptile, one of the sauropodous dinosaurs, possibly *Apatosaurus*. The position of these bones in the body of the animal is indicated by the arrow in Fig. 17. The sauropodous dinosaurs were the most gigantic of all land vertebrates, although not nearly so large as some of the modern whales. The largest of these reptiles attained a length of nearly 70 feet and an estimated weight of 39 tons. The head was approximately the size of that of a modern draft horse and the contained brain was no larger than one's fist. The lumbar intumescence, however, was ten times the size of the cephalic portion of the nervous system, or at least the subdural space was. Whether the nervous material filled the entire cavity or not is unknown. The animals lived, possibly, in the swamps and low-lying rivers, feeding on the succulent

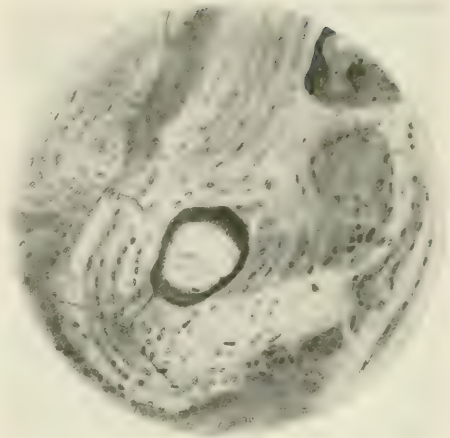


FIG. 16. This figure will show the possibilities in the microscopic study of fossil bones. The drawing, 300 diameters, shows the osseous lacunæ, with short canaliculi arranged around a large vascular opening, thus simulating an Haversian system. The lacunæ of dinosaur bones are much smaller than are the lacunæ in other extinct forms. The dark areas are due to the staining of iron with which the bones are infiltrated. The section was taken from the periphery of the specimen shown in Fig. 14.

vegetation, and are said to have been capable of attaining the ripe age of 1,000 years. Diseases are rarely seen on fossil dinosaur bones, in spite of the great abundance of their remains.

The tail in some of these large animals was very long and slender, and it may have been used in swimming, as a muskrat uses his today. The terminal caudals in some species were reduced to mere slender rods of bone, so that a fracture or an injury of

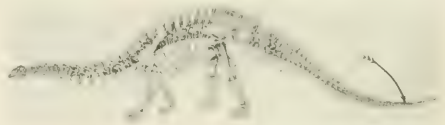


FIG. 17. Outline figure with skeleton, of *Bron-tosaurus*, showing at the arrow the location of the vertebrae shown in Fig. 14. This animal attained a length of nearly 70 feet, a height of 15 feet and a weight of many tons. (Based on a figure by Matthew.)

any kind in this region could easily occur. Aside from possible blows from the head, the dinosaur to which the above described vertebræ belonged was entirely defenseless. The tail, for example, might be seized by one of the carnivorous dinosaurs and vigorously chewed for some time before the owner of the tail was able to turn his huge body and knock the offender away.

Lesions of a similar nature, but not so well developed, are known to occur in the tail of *Cetiosaurus Leedsi*, an English dinosaur; and Hatcher has described the same lesions in the tail of *Diplodocus*. A fuller discussion of these lesions is reserved for another time.

The nature of the above-described lesion is such that it may have been due to bacterial activity, and suggests, at any rate, the presence of pathogenic bacteria in the early part of the Cretaceous period. Bacteria and primitive fungi have, indeed, been described from much older periods. The best account of their occurrence is contained in "Microorganismes des combustibles fossiles," by B. Renault.³⁴ Renault has described and figured many forms of bacteria and fungi in the fossilized feces (coprolites) of fishes, in fossil wood, and in coal. He has also discovered in the teeth of some ancient fishes what he regards as indications of the activity of organisms which have produced results similar to *caries*. He shows in one of his plates photomicrographs of fossil bone from the petrified feces in which the ravages of the bacteria, *Micrococcus* are evident in the canaliculi and the bone corpuscles, which appear in various stages of destruction.

Other deforming arthritides are represented by the arthritic condition sometimes spoken of as rheumatoid arthritis which has been noted by Virchow in the cave bears, by other observers in certain fossil human

skeletons, in the famous Lansing man of Kansas,³⁵ and it is probably indicated in the Cretaceous mosasaurs, where a well-developed osteoma accompanied the arthritic inflammation.

4. **OSTEOMYELITIS** is probably indicated in the dinosaurian caudals figured herewith and in certain phalangeal elements of a giant wolf from the Pleistocene of California.

5. **EXOSTOSES** due to trauma, indicated as callous growths around fractures of ribs and limb bones, or as outgrowths due to chronic irritation or infection, are fairly common among fossil vertebrates. Healed fractures (Fig. 7) are very common among mammals and are occasionally seen among fossil reptiles. Dinosaurs exhibiting broken ribs, vertebræ, and horn cores attest the accidents or fights which caused these traumatic conditions, and has led Abel to infer that the males of these animals contested during the breeding season for the female. An exostosis which is especially clearly marked is evident on the inner or visceral surface of a dinosaur scapula, where it takes the form of a hook-like process, evidently due to chronic irritation. An exact duplicate of this lesion may be seen on a recent human femur. One of the most perfect exostoses is seen in a mosasaur from the Cretaceous of Kansas where there is a decided lump at the articular surface between the third and fourth dorsal vertebræ, resulting in what is probably the only known fossil osteoma. Curious exostoses which are bilaterally symmetrical occur on the radii of an Oligocene dog, the skeleton of which is in the Carnegie Museum of Pittsburgh.

7. **OSTEOSARCOMATA** have not been positively identified among extinct animals, but the condition is suggested in several instances. Esper, in 1774, described what he thought was an osteosarcoma in the femur of a cave bear, but Mayer, who studied

³⁴ B. Renault: "Microorganismes des combustibles fossiles," *Bull. Soc. de l'Industrie minérale Saint-Etienne*, Paris, 1899-1900, Tomes 13-14, with folio atlas of 20 plates of photomicrographs.

³⁵ Charles A. Parker: "Evidences of Rheumatoid Arthritis in the Lansing Man," *Amer. Geol.*, 1904, vol. xxxiii, pp. 39-42, fig. 1.

the specimen later, suggested that it might have been a fracture with callus and necrosis.

8. **FISTULÆ** are evident in the lower jaw of an ancient and primitive whale from the Eocene of Egypt, and an enlargement of the mandible of a three-toed horse from the Miocene of North America indicates the presence of a fistula, possibly due to *actinomycosis*, in its early stages. Dental fistulæ are occasionally seen among the known remains of fossil man, often resulting in the loss of teeth.

9. **RICKETS** is indicated, according to Abel, among the apes which are found mummified in the old Egyptian graves.

10. **NECROSES**, due possibly to a variety of causes, and attributed by certain French writers to tuberculosis, are fairly common among fossil vertebrates. A marked necrosis of the ilium of a

large dinosaur, accompanied by expansion and thickening of the bone, is evident in the mounted skeleton of *Camptosaurus* on exhibition at the National

Museum in Washington. A mosasaur bone from the Cretaceous of Kansas and certain crocodile limb bones from the Jurassic of England show lesions of a necrotic nature.

The assignment of any of the lesions to a definite cause is manifestly impossible, and while tuberculosis has been suggested as a possible cause, the diagnosis is so uncertain as to be nearly worthless. In the crocodile skeleton, above referred to, there is abundant evidence that the infection, the focus of which was in the pelvis, was carried by metastasis to the bones of the palate which were also involved, as well as other parts of the body.

11. **HYPEROSTOSIS** or **PACHYOSTOSIS**, which is similar to the enlargement of the bones in Gigantism, is indicated as thickened and enlarged portions of the skeleton. This condition has been detected in certain fossil Paleozoic fishes and Mesozoic

reptiles, some of them of great geological antiquity. A genus of fossil whales, known as *Pachycanthus*, has the neural, vertebral spines very greatly enlarged and swollen.



FIG. 18. The arm bones of a mosasaur from the Cretaceous of Kansas, showing lesions resembling osteoperiostitis. The large bone is the humerus, the other probably a radius. The rough surface of the bone indicates its pathology. Normal well-preserved specimens of these bones are quite smooth. The lesions have an arthritic nature also, though they are not confined to the articular surfaces. $\times \frac{1}{2}$.

The specimens are the property of the University of Kansas Museum of Natural History.

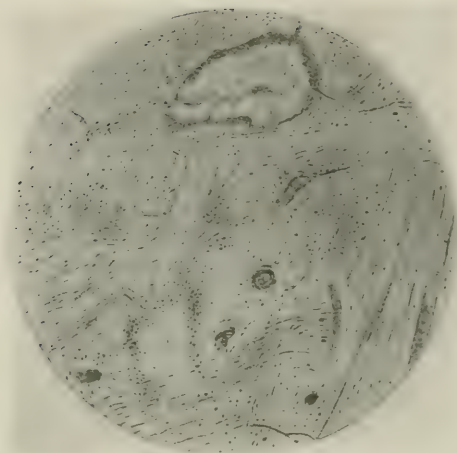


FIG. 19. Microscopic section of one of the lesions from the surface of the humerus, Fig. 18, showing bundles of perforating fibers of Sharpey, osseous lacunae, and vascular openings. The large clear space at the upper portion of the picture is a vascular opening filled with calcite crystals. 300 diameters.

A similar condition is seen in the skeleton of a Triassic nothosaur. We are not justified in stating on these evidences the presence of pituitary disturbances in ancient animals, but further studies in this line may add very interesting data.

12. **OSTEOPERIOSTITIS** or some similar disturbance is the result seen in the arm bones of a mosasaur from the Cretaceous of Kansas (Fig. 18). The articular surfaces are very greatly roughened and the surfaces of the bones are covered with smooth, somewhat flattened excrescences, possibly due to a subperiosteal irritation. The lesions have been observed in no other instances, so that no comparative statements can be made. Microscopic study of the peripheral lesions reveals many interesting histological details. One area shows typical osteoid tissue, similar in all essential respects to

osteoid tissue developed in a human humerus in a case of osteomyelitis. Other areas, such as the one figured (Fig. 19), show perforating fibers of Sharpey, as seen in the dark bundles, and the nature of the osseous lacunae. The whole section is filled with vascular spaces. An especially large one, filled with calcite crystals, is seen in the upper portion of the picture. There are no apparent Haversian systems or canals. Whether this is due to the pathology of the bone or whether it is an occurrence in normal bone of the mosasaurs will be determined later by microscopic study of the normal tissues.

13. **OPISTHOTONOS** and the allied phenomena, **pleurothotonos** and **emprosthotonos**, are quite frequently seen among fossil vertebrates. It has been suggested elsewhere that these attitudes represent possible cerebrospinal infections or other neurotoxic conditions, and they must be considered in connection with the study of disease among fossil animals.³⁶ The skeleton of the small dinosaur, *Struthiomimus altus* (Fig. 20), described by Osborn,³⁷ shows a very well-developed condition of opisthotonos, with the head thrown sharply back, the tail strongly flexed, and the toes contracted and appressed. The whole attitude strongly suggests a spastic distress, possibly brought on by some form of poisoning of the central nervous system, from infection or the deglutition of some poisonous substance.

14. **OSTEOMALACIA** is evidently the cause of the hypertrophy of the bones of *Limnocyon potens*, an early carnivore from the Washakie Eocene of Wyoming, nearly 3,000,000 years old.

MATERIALS AND METHODS

The material described in the present paper has been loaned the writer for description by the Field Museum of Chicago,

³⁶ This subject has been discussed at length by the writer, in "Opisthotonos and Allied Phenomena among Fossil Vertebrates," *American Naturalist*, 1918.

³⁷ Osborn: *Bull. Amer. Mus. Natl. Hist.*, 1917, vol. 35, p. 733, pl. 28.

by the American Museum of Natural History of New York City, by Walker Museum of the University of Chicago, and by the University of Kansas Natural History Museum.

made by the well-known petrographic methods so common in all geological laboratories. The diagnoses, where they are attempted, are made from comparisons of the



FIG. 20. The skeleton of *Struthiomimus altus*, a small dinosaur from the Belly River series (Cretaceous), Red Deer River, Alberta, Canada, now regarded as of approximately the same age as the Judith River series. The unique feature of the skull is the total absence of teeth, with a size of skull one-third larger than the ostrich and a length of body of about fifteen feet. The position of the skeleton is decidedly that of the opisthotonos which may be regarded as an indication of disease. (After Osborn).

A beautiful specimen of an osteoma, the only one known so far, on the vertebra of a Kansas Cretaceous mosasaur, was given the writer by Dr. J. M. Armstrong of St. Paul. The writer expresses his obligations to the gentlemen connected with the above-mentioned institutions and to Dr. Armstrong.

The methods used are a combination of procedures in the various lines involved. Microscopic sections, which can be made thin enough for immersion lens study, are

material with similar lesions in recent human material; but strict diagnosis has not been attempted. We must have some name for the lesions, so the terms used must be regarded as suggestive rather than an accurate statement of conditions. The interpretation of the lesions in the fossil material is a matter of experience with fossil remains. The author feels that twelve years experience in the study of fossils should be sufficient to avoid most of the usual pitfalls.

PLAGUE TRACTATES

By DOROTHEA WALEY SINGER AND REUBEN LEVY

OXFORD, ENGLAND

- I. *Introduction* By DOROTHEA WALEY SINGER
 II. *Sir John Mandeville, Jean d'Oultremeuse and the Physician, Bearded John of Burgundy* By DOROTHEA WALEY SINGER
 III. *Translation of Hebrew Versions of John of Burgundy's Tractate* in Bibl. Nat. Fonds hébreu 1191 (VIII) and Bibl. Nat. Fonds hébreu 1124 (VIa). With Notes By REUBEN LEVY
 Appendix I. References to Tomb of John of Burgundy in Liège.
 Appendix II. Text of Hebrew Versions of John of Burgundy's Tractates. Bibl. Nat. Fonds hébreu 1191 (VIII) and Bibl. Nat. Fonds hébreu 1124 (VIa) with facsimiles from both MSS.

I. INTRODUCTION

DURING the later middle ages and earlier renaissance, and especially during the one hundred and fifty years that succeeded the visitation of the Black Death of 1348, Europe was repeatedly devastated by waves of pestilence that swept over the continent, usually in the direction from the East and South towards the West and North. These terrible epidemics left deep their stamp on the literature of the period— theological, political, and medical. The contemporary medical writings on the plague consist mainly of short treatises or tractates.¹ They are to be found in every European language and several of them have been translated into Hebrew.²

Among the most influential and widely circulated of the plague tractates was one

written in 1365, which professes to be the work of John of Burgundy, otherwise known as John à la Barbe.³ This has been printed several times, and recently a French version has been published from a manuscript dated 1371—only six years after the original issue of the work.⁴

The tractate professes to be the third by its author on the same subject. He gives the "incipit" and subject matter of his previous works on the plague, which he describes as well known, but so far they have not been satisfactorily identified, if, indeed, they ever existed outside the imagination of the old physician.

After an astrological introduction to the work, the author describes himself as "Johan de Bourgogne, otherwise called à la Barbe, citizen of Liège and professor of the art of medicine, though the least of all physicians". This last tribute to modesty

¹ Cf. K. Sudhoff "Pestschriften aus den ersten 150 Jahren nach der Epidemie des Schwarzen Todes 1348," in *Arch. f. Gesch. d. Med.*, Leipzig, 1909-16 (in progress), vols. ii-ix; and Dorothea Waley Singer "Some Plague Tractates (14th and 15th centuries)" in *Proc. Roy. Soc. Med.*, London, 1916, vol. ix. (Section of the History of Medicine).

² Besides the plague tractate, of which the Hebrew version forms the subject of this paper, Hebrew versions of the plague writings of Antonio Cermisone, Francesco da Gagnili, Gentile da Foligno, Antonio Guainerio and Pietro de Tussignano are noted by

M. Steinschneider in "Die Hebräischen Uebersetzungen des Mittelalters und die Juden als Dolmetscher", Berlin, 1893, pp. 790-1, 799-800, 804, 818, etc.; and in *Il Buonarroti*, Rome, 1876, vol. xi, pp. 113-114. Doubtless an examination of the manuscripts of the great libraries would reveal more of these Hebrew versions and translations.

³ Not to be confused with Giovanni Borgondio of Pisa (died 1190), who translated Galen's "De Regimine Sanitatis".

⁴ Dorothea Waley Singer, *loc. cit.*, Appendix.

he takes care to discount by frequent allusions to his success and long experience. The influence of this text may be traced directly and indirectly in many fourteenth and fifteenth century works on the plague. One, that was immensely popular throughout England, bears in most versions the name "John of Bordeaux, a noble physician".⁵ This "John of Bordeaux" is often confused with the above-mentioned "John of Burgundy", whose work appears to constitute his sole source.

Five Hebrew texts have been described as versions of the tractates, either of John of Burgundy or of John of Bordeaux. Before examining these texts we will summarize for the reader the evidence as to the identity of John of Burgundy, who, it will be shown, had almost certainly a share in the authorship of the "Travels of Sir John Mandeville".

II. SIR JOHN MANDEVILLE, JEAN DESPREIS DIT D'OULTREMEUSE, AND THE PHYSICIAN, BEARDED JOHN OF BURGUNDY

From the fifteenth to the eighteenth century the identity of the author of the famous "Travels of Sir John Mandeville", with a certain Liège physician described as *Bearded John*, *Johannes ad Barbam*, or *Jehan à la Barbe*, was too universally accepted to excite discussion. In the Guillelmitte mon-

astery at Liège (completely destroyed in 1798), there existed indeed a tombstone, bearing the following inscription:

"Hic iacet vir nobilis Dominus Joannes de Mandeuil alias dictus ad Barbam, miles, Dominus de Campdi, natus in Anglia, Medicinæ Professor, devotissimus Orator et bonorum suorum largissimus pauperibus, erogator qui toto quasi orbe lustrato, Leodii vitæ sue diem clausit extremum Anno Domini 1372, Mensis Novembris die 17"

and around the coat of arms were inscribed the words:

"Vos Ki passeis sor mi, pour lamour
Deix proi pour mi."⁶

The evidence from the tombstone is supplemented by an extract from a fourteenth century manuscript of the "Myreur des Histors" of Jean des Preis, dit d'Oultremeuse, clerk and notary at Liège, and Audencier in the Court of Justice (born 1338). It is here recounted that on his death-bed the physician, Jean de Bourgogne called à la Barbe, revealed himself to d'Oultremeuse, declaring that he was none other than Sir John Mandeville, the famous English traveler, and that he had left his native land owing to having "had the misfortune" to kill a nobleman. The passage cited is from the fourth part of the "Myreur des Histors", now unluckily lost.⁷

⁵This work, arranged in four chapters, was current in England about the year 1390, when the country was attacked by plague. It is based entirely on our text, and the problem remains unsolved whether "John of Bordeaux" was indeed the author's name or was a version of the name "John of Burgundy". But the *incipit* and subject matter described in our text do not quite correspond with those either of this work or of a further abbreviated version in the form of an attractive little "Epistle on the Plague" from about the same date, of which copies are only known to exist in England. See D. Waley Singer, *loc cit.*, p. 172 et seq.

⁶The evidence for the existence of this tomb is summarized in Appendix I.

⁷"L' an MCCCCLXXII mourut à Liège, le 12 Novembre, un homme fort distingué par sa naissance, content de s'y faire connoître sous le nom de Jean de Bourgoyne, dit à la Barbe. Il s'ouvrit néanmoins au lit de la mort à Jean d'Oultremeuse, son compère et institué son exécuteur testamentaire. De vrai il se titra dans le Précis de sa dernière volonté Messire Jean de Mandeville, chevalier, comte de Montfort en Angleterre et seigneur de l'isle de Campdi et du Château Pérouse. Ayant cependant eu le malheur de tuer, en son pays, un comte qu'il ne nomme pas, il s'engagea à parcourir les trois parties du monde. Vint à Liège en 1343. Tout sortie qu'il étoit d'une noblesse très distinguée, il aima de s'y tenir caché. Il étoit, au reste, grand naturaliste, pro-

Further circumstantial evidence seems to be offered by the "Travels" themselves. In the final chapter of the earliest Latin version we find a curious story which may be translated here:

"In the year 1355 of the birth of the Lord Jesus Christ I was staying in the city of Liège, and owing to the severity of my arthritic gout I lodged then in the street called *Bassesaueny*. And I consulted various doctors of the town as to my convalescence, and it happened by the will of God that there came one physician more venerable than the others by reason of his age and grey hairs, and evidently expert in his art. He was known there as Master Johannes ad Barbam. And when I would have spoken also with him he intervened, and after some words he at length renewed the acquaintance that we previously had at Cairo in Egypt, at [the court of] the Soldan Calalxlich as I mentioned above, in Chapter VII of this book. And when he had most excellently demonstrated upon me his experience in his art, he urged me and did most instantly entreat me that I should set down in writing somewhat of those things that I had seen during my travels throughout the world, that they might be read and heard for the benefit of posterity. So that at

length, thus urged and with [his] help this treatise was composed. Nor indeed did I propose to write aught of it until at least I should have reached my native England.

"And I believe that by the providence and grace of God I attained that which was ordained for me. For from the time that I wrote it down our two kings of England and France have not ceased each in turn to perpetrate great destructions, depredations, ambushades and slaughter, so that unless defended by God I should never have passed over without death or danger of death and many accusations. And now behold in the thirty-third year since my departure I am established in the city of Liège which is but two days' journey from the English sea, and I hear that the hostile words of our rulers are by the grace of God reconciled. Wherefore I hope and propose for the rest, as befits my ripe age, to be enabled to turn to my own land for the ease of my body and the health of my soul."

If we turn to Chapter VII of the work we find a description of the first meeting between Mandeville and the physician in Cairo, and we are assured "Long afterwards and in a far distant place, viz., the town of Liège, exhorted by this venerable man and with his help, I composed the

fond philosophe et astrologue, y joint en particulier une connoissance tres singulière de la physique se trompant rarement lorsqu'il disoit son sentiment à l'égard d'un malade, s'il reviendroit ou pas. Mort enfin, on l'enterra aux F. F. Guillelmins, au faubourg d'Avroy, comme vous avez vu plus amplement au dessus."

See S. Bormans in *La Bibliophilie Belge*, Brussels, 1866, vol. i, p. 236, and in the "Chronique et Geste de Jean des Preis dit d'Oultremeuse", Brussels, 1887, vol. i. Intr. p. CXXXII, et seq.

The passage is derived from a complete manuscript of the "Myreur des Histors", written by Jean de Stavelot, a friend of d'Oultremeuse and monk of the Abbé de St. Laurence at Liège, where this

manuscript was known to exist as late as 1750. Our extract was first made from the manuscript by Louis d'Abry (1643-1726), Herald and Archaeologist of Liège who, however, modernized the language. Bormans states that this modernized version of d'Abry is to be found in the Library of Count d'Outrement, where it bears the number "66". It was copied by Jean Gilles LeFort, Herald of Liège from 1682 until 1718 or perhaps by Jean Henri LeFort who occupied the office until his death in 1751. The passage is cited by Bormans from the "Le Fort Manuscripts", Series ii, vol. xxvii, p. 102, forming part of the Liège archives. For details of the Lefort family, see S. Bormans in *Bull. de l'Inst. Archéologique Liégeois*, vol. iv, Liège, 1860, p. 319.

present treatise as I will narrate fuller at the end of this work.⁸

With the exception of a few medical recipes at Heidelberg and in the Bodleian Library, the only work, besides the "Travels," hitherto known as bearing the name of "Sir John Mandeville" is a lapidary.⁹

In the Amiens fifteenth century manuscript of the "Travels,"¹⁰ this "Lapidary" is given as a sort of postscript under the name, not of "Mandeville", but of "Johans à la Barbe". Thus immediately after the *Explicit* of the "Travels" we find:

"Chy comenche le lapidare maistre
Johans à la Barbe",

while the *explicit* at the end of the whole codex runs:

"Chis libre est appelleis le Livre Johans
de Mande Ville, chevalier qui fut fait,
escriit, copileit et extrais hors d'une
aultre en la ville de Hotton, par le

⁸ These quotations are translated from folios i.vii. *recto* and *verso*, chap. I and folio b.iii, *verso*, chap. vii of the printed Latin version (Brit. Mus. 66,700) described in a manuscript note on its first page as the first printed Latin edition, dating probably from about 1480. Cf. G. W. Warner. "The Duke of John Mandeville, Knight, 1322-1356, a hitherto unpublished English version from the unique copy (Egerton MS. 1892) in the British Museum, edited together with French texts, notes and introduction." Pub. by Roxburgh Club, Westminster, 1889, p. vii. Warner mentions 12 manuscripts and 5 printed editions of this Latin version.

Hénaux, *Bull. de l'Inst. Archéologique Liégeois*, Liège, 1860, vol. iv, p. 159, quotes a similar passage from a French manuscript since lost (No. 360 of Liège University Public Library, fol. 118). This French version described the physician as "maistre Johans de Bourgogne dit ale barbe". It gives 1356 for the year of the composition of the "Travels," "in the 34th year of my wandering". Hénaux also cites a Latin version of Martins de Alost, of the year 1491, as describing the same incident. The story appears again in a fifteenth century French manuscript version of the "Travels" in the Public Library of Amiens, manuscript Fonds Lescalopier 94 (5200). Our physician is here described as "uns venerable homme et discreit, maistre Johans à la Barbe, phisiciens", and the same dates are given for Mande-

main Lambert le clers, pour et on nom de mon très vaillant et très honoréis signour mon damoysiaux Lovuy, signeurs de Rochefort et d'Agymont, etc., sur l'an de graace de la sainte nativiteit Nostre Seigneur Jhesu Criste milhe quatre cens et sissante et unck, en moy de may, etc."¹¹

The manuscript thus supplements the already-known evidence that in the fifteenth century Sir John Mandeville and John à la Barbe were regarded as one and the same person.

In the latter part of the nineteenth century the long-forgotten belief in Bearded John's authorship of the "Travels" was again brought forward by Bormans,¹² Nicholson,¹³ Warner,¹⁴ and later writers.¹⁵ Recently the subject has been carefully in-

ville's flight from England and for the composition of the "Travels". We have not had the opportunity of examining this manuscript, and these passages are cited from the *Catalogue Général des Manuscrits des Bibliothèques Publiques de France, Départements*, "Amiens" by E. Cocyteque, Paris, 1893, Tome xix, p. 493.

⁹ "Le Lapidaire en françoys", compose par messire jehan de Mandeville (?) Lyons (?), 1531; Paris, 1561; s. l. et d., probably before 1580, and "Le Grand Lapidaire," Paris, 1561. This latter edition was republished with notes by Y del Sotto, "Le lapidaire du quatorzième siècle. Descriptions des pierres précieuses et de leurs vertus magiques d'après le traité du Chevalier Jean de Mandeville", Vienne, 1862.

¹⁰ Amiens Public Library. Manuscripts Fonds Lescalopier 94 (5200).

¹¹ E. Cocyteque, *loc. cit.*

¹² S. Bormans, *loc. cit.*

¹³ E. W. B. Nicholson and Sir Henry Yule. Article: "Sir John Mandeville", in "Encyclopædia Britannica", 1883 ed. Cf. E.W.B. Nicholson in *Academy*, xxv, p. 261, 12 April, 1884.

¹⁴ G. F. Warner: *loc. cit.* See also G. F. Warner in the "Dictionary of National Biography", art.: "Sir John Mandeville."

¹⁵ Cf. A. Bovenschen in *Ztschr. d. Gelsellsch. f. Erdkunde*, xxiii, p. 194, Berlin, 1888, and "Quellen für die Reisebeschreibung des Johann von Mandeville", Berlin, 1888.

vestigated by Professor Paul Hamélius,¹⁶ whose weighty opinion supports the suggestion first made by Warner, that Jean des Preis, dit d'Oultremeuse, was himself largely responsible for the "Travels". Professor Hamélius concedes, however, that the tombstone in the Guilelmitte monastery can hardly have been erected to a wholly fictitious character, and he accepts the hypothesis that most probably our physician, Bearded John, collaborated in the production with his friend and fellow townsman, Jean d'Oultremeuse. This hypothesis perhaps gains further support by the fact that d'Oultremeuse was himself the author of "Le tresorier de philosophie Naturelle des pierres précieuses".¹⁷ At the end of this work is a list of philosophers in which we read, in almost the same words used in the "Myreur

des Histors" of the "noble homme, seigneur Jehan de Mandeville, chevalier, seigneur de Montfort, de Castelperouse et de l'isle de Campdi"¹⁸ qui fut en Orient et es parties par della par longtemps, si en fist unq lappidaire selon l'oppinion des Indois". May we not perceive the Liège notary enjoying a quiet chuckle as he penned these lines?

It would be interesting to compare the two manuscripts of the Lapidaire d'Oultremeuse with the "Lapidary of Mandeville", with a view to ascertaining whether the internal evidence for common authorship, as well as common sources, is as strong in the case of the "Lapidaries" as in that of the "Travels" and the "Myreur des Histors". Professor Hamélius¹⁹ suggests that the joke of d'Oultremeuse was perhaps

¹⁶ Prof. P. Hamélius: "Transactions, Bibliographic Society", London, 1916, xiii, p. 193, and *Quart. Rev.*, 1917.

¹⁷ The "Lapidary" of d'Oultremeuse survives in a fifteenth or sixteenth century manuscript in Paris, Bibliothèque Nationale, Fond Français 12,326, published by A. Michéant in "Notice sur un manuscrit de Jean d'Oultremeuse", in *Bull. de l'Inst. Archéologique Liégeois*, Liège, 1870, x, 39. Another sixteenth century copy formed Barrois ccclxviii in the Ashburnham Collection. (See Sotherby, "Auction Catalogue", 1901, Item 439.)

¹⁸ No such places as Campdi or Château Pérouse have been traced, but as regards the title "Comte de Montfort", Warner makes the ingenious suggestion that perhaps this was a misinterpretation for "du Comte de Hertford". Mandeville calls himself in the prologue to the "Travels" a "chivalier . . . neez ex norriz Denglaterra de la ville Seint Alban". The monastery of St. Albans in Hertfordshire used to show precious jewels which it claimed to have received from the author of the "Travels" and of the "Lapidarium". Early records of the monastery claim "Johannis de Mandevilla, miles Anglicus, in villa Sancti Albani oriundus" (E. A. Bond, "Chronica Monasterii de Melsa a fundatione usque ad annum 1396 auctore Thoma de Burton abbate accedit ad annum 1406", London, 1868, vol. iii, p. 158), and "Dominus Johannis de Mandeville, Miles, pervagator poene totius orbis . . . hic in villa de Sancto Albano materno utero fusus est". (H. T.

Riley, "Chronica Monasterii S. Albano a Johanne Amundesham monacho", London, 1871, vol. ii, p. 306. Appendix E from a number of tracts, probably by Thomas Walsingham who continued the Chronicon. Both the works of Bond and Riley form part of the "Chronicles and Memorials of Great Britain and Ireland during the Middle Ages", published by the Master of the Rolls.)

In the seventeenth century John Weever, while recording the claim and setting down the St. Albans epitaph, remarks of Mandeville "That he was born here in this towne I cannot much deny; but I am sure that within these few yeares, I saw his tombe in the City of Leege, within the church of the religious house of the "Guilliamites. . ." (John Weever "Ancient Funeral Monuments within the United Monarchie of Great Britain, Ireland and the Islands adjacent", London, 1631, p. 567.) Speaking apparently of St. Albans, Weever adds: "The churchmen will shew you here his knives, the furniture of his horse, and his spures, which he used in his trauells". F. Hénaux, *loc. cit.*, tells us on the other hand that the knight's trophies of travel had been treasured and exhibited at their convent by the Guilelmitte brothers.

We may indeed concur with the opinion of Charles Ellis, who wrote in 1699: "At Leige is Sir John Mandeuil's Tomb, whose Epitaph is also at St. Albans with us, which may be hard to be reconciled" (*Phil. Tr. Roy. Soc.* 1703., vol. xxiii, No. 286, p. 1418).

¹⁹ *Quart. Rev.*, *loc. cit.*

taken seriously by pious descendants of our Liège physician, who may have erected the Guillelmitte tombstone in a mistaken belief in their exalted ancestry.²⁰

Are we then to place no credence in the "knight's" romantic story of his flight from England? Perhaps it may have at least been suggested by the experience of John of Burgundy himself.

The internal evidence of the "Travels" indicates a certain knowledge of the middle English language of the period.²¹ Moreover, it is remarkable that a certain "Johan de Burgoyne, chamberlain" (to John de Mowbray), does figure in the civil disturbances in England during Edward II's reign, and that the pardon previously granted to him was revoked in May, 1322,²² the very year, according to the "Travels", of the author's departure from England. The author of the "Travels" speaks of "1355, anno egressionis mee 33".

On referring, however, to the records in the Parliamentary Writs, we find a curious coincidence. Among the list of those whose pardon, granted in August, 1321, was re-

voked in May, 1322, there occur the following three names: "Johan le Barber de Catthorp," "Johan Mangevilayn . . .", and "Johan de Burgoyne, Chamberlain". These and similar names indeed dog one another in English annals of the period as though for our special confusion.²³

But on the whole, the great balance of evidence does point to a real John of Burgundy, otherwise known as La Barbe, as having shared with d'Oultremeuse in the authorship of the work attributed to Sir John Mandeville, while it seems not improbable that this physician of Liège did originally hail from England. It is not without interest to recall that it was during the latter half of the fourteenth century that Queen Philippa's weavers were established in England. Already we may observe industry sharing with scholarship in the slow task of pioneering international amenity, and during the years when our physician was a figure of some little importance in the town of Liège, the Low Countries, on their part, were laying the foundation of a new industry in Great Britain.

²⁰ It has even been surmised that possibly the name "Mandeville" was suggested to the authors of the "Travels" by the contemporary work of Jean du Pin, "Mandevie," which describes a voyage of exploration through the moral world, somewhat parallel to Sir John Mandeville's journeyings over the terrestrial globe.

²¹ Warner, *loc. cit.*, p. 71; British Museum MSS. Egerton 1892, fol. 60; Harley No. 4383; chap. xv, Cotton MSS., Titus, cxvi, fol. 60.

²² "Parliamentary Writs," vol. 2, div. 2, Part 2, Appendix pp. 167, 168, London, 1830; and vol. 2, div. 3, p. 619, London, 1834. "Parliamentary Writs", vol. 2, div. 2, Part 2, Appendix p. 69; vol. 2, div. 3, p. 1138.

²³ Thus in a list of horses and their owners, in 1298, we find "Johannes de Maundevill . . . habet unum badium," and "Dominus Johannes Bourdun habet 3 equum" (H. Gough, "Scotland, in 1298", Paisley, 1888, p. 163). But if we identify this "Johann de Mandeville" with the bearer of that name recorded in other contemporary documents, we find that he could hardly have survived until 1372. (Cf. C. Roberts: "Calendarium Genealogicum", London, 1865,

vol. 1, p. 240, and Morant: "History and Antiquities of Essex", London, 1768, vol. 2, p. 123.)

J. Hutchins: "History of Dorset", 1864, p. 261, etc. "Inquisitiones Post Mortem", vol. 1, pp. 59, 81, 126 and 202; vol. 2, p. 219. "Patent Rolls", pp. 142, 361; "Parliamentary Writs", vol. 2, div. 2, part 1, p. 727; part 2, pp. 380, 82, vol. 2, div. 3, p. 1138).

We do not give details of the later confusion of "Mandeville" with "John Manduith", fellow of Merton College, Oxford. The source of this error is probably the entry under Mandeville's name in J. A. Fabricius *Bibliotheca Latina Mediæ et Infimæ ætatis*, Hamburg, 1734, vol. iv, p. 289, and subsequent editions. Three works of Manduith are, probably by a printer's carelessness, here attributed to Mandevill:

tabulæ astronomica
de chorda recti et umbra
de doctrina theologica.

There is a quite separate entry for Manduith himself and the three works are duly given in it as his productions. Subsequent copyists overlooked the entry under "Manduith" and attributed the works to Mandeville. The error is perpetuated by Bormans.

III. HEBREW VERSIONS, NOW IN THE
BIBLIOTHEQUE NATIONALE, OF THE PLAGUE
TRACTATE OF BEARDED JOHN²⁴

Paris Bibliothèque Nationale, Fonds hébreu
1191 (viii) and Fonds hébreu 1124
(vi a)

Both the manuscripts here translated are now in the Bibliothèque Nationale, at Paris. Though each contains only a fragment of John of Burgundy's Treatise, it will be seen that the two combined present an almost complete version of the work. We have been unable to obtain any information as to R. Benjamin ben Isaac of Carcassonne, described as the translator of MS. 1191 (viii). Both manuscripts are on paper. Zotenberg ascribes MS. 1191 (viii) to the fifteenth century, and MS. 1124 (vi a) to the sixteenth century. We reproduce the first page of each:

Paris Bibliothèque Nationale
Fonds hébreu 1191 (viii)
[Ancien Fonds 404] folio
141 Verso

A Very Noble Treatise on Cor-
ruption of the Air and on the
Pestilence (Fol. 141, Verso)

GENERAL INTRODUCTION

(Fol. 97, recto line 13)* In²⁵ the course of time air is corrupted, and it becomes plague-stricken. However, I do not say

²⁴ A copy of our extract from Paris Bib. Nat. Fonds Hébreu, MS. 1124, as well as of the next item in the MS., appears to exist in Vienna, Kön.-Kais.-Hof-Bibliothek, Heb. MS. 158 (ii), while a copy of our extract from Paris Bib. Nat. Fonds hébreu, 1191, is cited by Steinschneider as belonging

that the air becomes corrupt in its essence—for it is an elementary substance—but it is because of vapours which are mingled therewith that the air is called corrupt. Plague results therefrom in many countries, and in many places there still remain traces of the Plague. And this is clear from the fact that many men die, being full of evil humors.

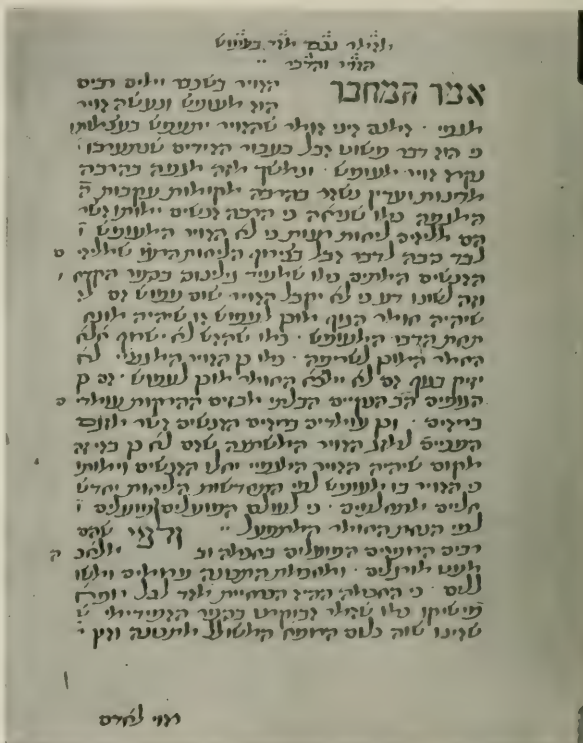


PLATE I. Facsimile from Bibliothèque Nationale, MS. Fonds Hébreu 1191 (VIII) fol. 141, verso.

first to Dr. Berliner, then to Günzburg. A. Neubauer (*Israelitische Letterbode*, vol. ii, pp. 84), suggests that there is at Leeuwarden another copy of this work, but this we have been unable to identify, in spite of the kind help of Dr. V. F. Büchner, of the Leyden University Library.

* The references to the original manuscript which appear in this article in italics are to the French version of the Treatise, dating from 1371, published in *Proc. Roy. Soc. Med.*, loc. cit. The references in lower case letters are to the Hebrew MSS.

The corrupt air alone is not the cause of pestilence, but it is the mixture of humours which fill the men that die. And Galen testifies thereto in his Book of Fevers, his words being: "know that the air receives no corruption, if the matter of the body be not prepared for the corruption or if it be not subjected to any corruptible thing.

Just as fire does not burn any matter save that which is prepared for burning, so the plague-stricken air does not harm the body unless it finds the matter prepared for corruption; so that bodies which are clean and have not neglected purging continue healthy. So, too, they continue healthy whose complexion²⁶ is contrary to that of

the affected air. For if it were not so, the people would sicken and die wherever the air is plague-stricken. For the air so corrupted generates various diseases according to the variety of humours, for the agents always work according to the disposition of matter in the patient."

Now there are many physicians who work with abstract wisdom (חכמה) but are little skilled in practice and are innocent and bare of the science of astrology, that science (*Fol. 97, verso*) being of supreme importance to the physician. As Hippocrates says in the book on Epidemics: "The physician that is innocent of astrology is worthless, [*Fol. 142, recto*] and no man should trust himself to be healed at his hands." For in a man possessing both the science of astrology and the art of healing, the one corrects the other and each science derives much support from the other, for not everything can be explained in the same way.

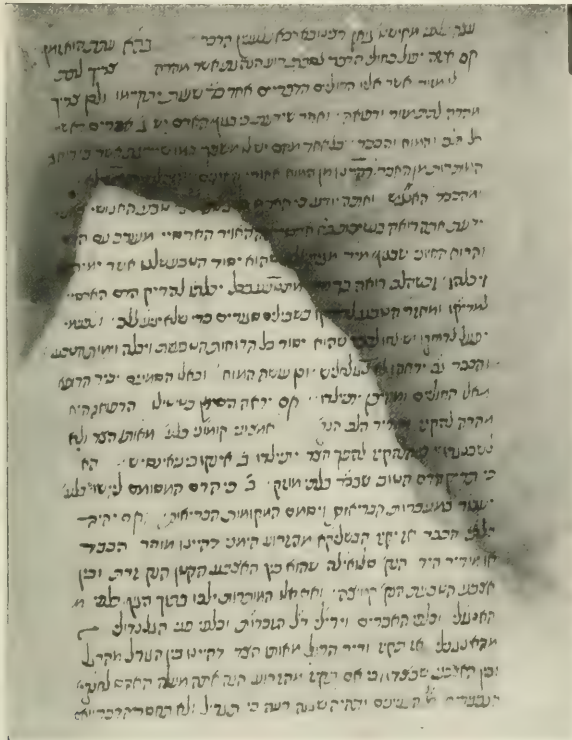


PLATE II. Facsimile from Bibliothèque Nationale, MS. Fonds Hébreu 1124 (VIa) fol. 133, verso.

For further references to these manuscripts see Zotenberg, "Catalogue des MSS. Hébreux et Samaritains de la Bibliothèque Impériale", Paris, 1866; M. Steinschneider, "Die Hebräischen Uebersetzungen des Mittelalters", pp. 803 *et seq.*; M. Steinschneider, Navorscher, 1862, Part ii, p. 50; M. Steinschneider, "Jewish Literature", pp. 198, 368, note 41; M. Steinschneider, *Magazin für die Wissenschaft des Judenthums*, Berlin, 1885, xii, p. 183; M. Steinschneider, *Il Buonarroti*, 1876, p. 114; M. Stein-

schneider, *Hebräische Bibliographie*, v. 69, xvii, 57, xxi, 98; M. Steinschneider, *Zeitschrift der deutschen Morgenländischen Gesellschaft*, vol. xxix, p. 165; A. Krafft & S. Deutsch, "Katalog der Handschriften der Hebräischen Werke der K. K. Hof. Bibl. Wien", Vienna, 1847, p. 167.

²⁵ Our Hebrew translation starts just *after* the opening of the Introduction, omitting the astrology.

²⁶ *Complexio* — mixture of humours = temperament (*temperare* — to mix).

And I have proved, having been occupied in physic for forty years or more, that a remedy administered under an adverse constellation, even though it be according to the art of medicine and correctly compounded and ordered, will not act according to the purpose of the practitioner nor to the benefit of the patient. A case in point is that if a remedy be given as a laxative, the patient will vomit it even though in the ordinary course he would not reject the remedy.

So that he that has not drunk fully of the waters of astrology cannot help a sufferer, especially not against pestilential diseases. As the prince of physicians says: "How can I heal when I know not the cause of the illness?" So, too, Avicenna in his "Cures of Fevers" says: "He that is ignorant of the cause cannot use the correct remedy."

This, too, is what Averroës intends when he says in his "Physica" that knowledge is the recognition of near and remote causes. That being so, since the heavenly matters are amongst the primary causes, one must endeavour to acquire knowledge of them; and it will therefore be plain that without astrology the healing process will be inadequate. For this reason many are defeated owing to lack of counsel.²⁷

PERSONAL INTRODUCTION

(*Fol. 98, recto*) Therefore I, Giovanni of Bourgogne, of the province of Liège,²⁸ professor of the lore of medicine and the least among physicians, in the days at the beginning of this Plague which came about in

the year 22 of the Short Era,²⁹ when it came on our borders, wrote a short treatise on astrology, together with this treatise of mine concerning the causes and the nature of this Plague, and many took copies of it. It begins thus: "My God, my God, etc."³⁰

³¹And when I saw that this Plague returned anew and was destined in course of time to appear again continually—for no end of it had been reached, and being grieved at the dying of people and eager to make some attempt for their benefit, I composed (*Fol. 142, verso*) this work and called it "Ezer Elohim" [the Help of God].³¹

My aim is to set out the prevention and cure of these diseases with completeness, so that scarcely any man may need a physician and that each may be his own physician, protector, guardian and guide.

First then we will speak of the fitting treatment.

He that desires to know my meaning with regard to the influence of the Heavenly matters and also of the terrestrial conditions let him see the aforementioned treatise which has been composed for these things.

And I, the least in quality and importance, Benjamin son of Isaac of Carcassonne,³² the translator, when I saw this treatise hidden away and sealed up in their stores, though tried and proved by noble

Era". This emended reading would give the year 1362 A.D. The Latin versions of the treatise, however, usually bear the date 1365 and we have encountered no other MS. of this text bearing an earlier date (except perhaps the Hebrew versions in Vienna), cf. Page 405, note 55.

²⁷ Our Hebrew translator here omits a passage in which Bearded John recommends the recipe of a certain Liège pharmacist.

²⁸ לֵיאוֹנִיִּס = *Leuensis* or *Leodicensis* (Liège not Lyons). See H. Gross; "Gallia Judaica", Paris, 1897, p. 306.

²⁹ M. Steinschneider: "Die Hebräischen Uebersetzungen des Mittelalters und die Juden als Dolmetscher", Berlin, 1889-1893, p. 804, suggests that "22" may be a copyist's error for "122 of the Short

Era". Original has "Deus Deorum"; hence MS. here probably for אֱלֹהֵי אֱלֹהִים or אֱלֹהֵי אֱלֹהִים.

³¹ Latin and French versions omit this sentence but describe a second work in addition to the present treatise.

³² Gross "Gallia Judaica", declares this MS. contains the only known mention of this personage. So too the "Jewish Encyclopedia", vol. iii, p. 28. Carcassonne is not far from Marseilles and near Narbonne and Montpellier.

physicians, applied all my energies to redeem it from their hands and to translate it from their tongue into the Holy Tongue that it might be a help and glory to us and to them that follow us. Praise be to the Helper. Amen.³³

PROPHYLAXIS

(Fol. 98, recto line 24.) I will begin by setting out the treatment as follows: It is good to guard against plethora of food and drink, to avoid baths and all such things that desiccate the body and open the pores; for the corrupt air enters by way of the open pores and so penetrates the body and corrupts it. For this reason also it is absolutely necessary to avoid coitus and to beware of eating fruits—if they are eaten they should be exiguous in quantity except they be sour fruits. It is good to partake only of easily digestible foods and wine of good flavour well diluted.

Every confection of honey must be avoided and every dish should be seasoned with vinegar.

In rainy and misty weather a fire should be made in the bed-chamber, and before he leaves the house in the morning or goes into an airy place the patient should use some fragrant medicament such as *diambra*, *diamus*, or *dianthus* with *musk pbilaris arquiticôn*, together with *musk* or the like. If he is too poor for this he should use *cloves*, *macis*, *nux muscada*, *zedoary* and other substances. He should take . . .³⁴

Paris, Bibliothèque Nationale. Fonds Hébreu 1124 (VIa) [Ancien fonds 417]

fol. 133, verso³⁵

Counsel by Maestro Giovanni de Cenobarba Concerning the Plague (Fol. 133, verso)

Blessed be the Lord. Amen. He hath ordained times.³⁶

³³ This passage is not in the original French or Latin.

³⁴ The text breaks off here and is followed on the next folio by a series of recipes written in the same hand.

PATHOLOGICAL THEORY, ETC.

(Fol. 99, recto, line 19). If anyone fall into the sickness of the plague through the ill manner of his living, it is necessary speedily to give him some remedy because such epidemic sicknesses become confirmed after twenty-four hours. It is therefore necessary speedily to give some remedy and medicine.

You know that there are three principal organs in man's body, namely the heart, the brain, and the liver. Each of these, as you know, has an emunctory through which it discharges its superfluities; that of the brain is behind the ears, that of the heart is the arm-pit,³⁷ and that of the liver in the groin.

You also know that the property of poison is to distress man's nature, as you know you can see in the bite of poisonous creatures. This poisonous air becomes mingled with the blood and with the vital spirit which is in the body and then immediately makes for the heart which is the foundation of our nature, in order to destroy and exhaust it. When the heart perceives this, it exerts itself violently to empty out the poisonous blood at its emunctory, and nature again attempts to send it into closed passages that it may not reach the heart.³⁸ And sometimes it labours to discharge it and to send it on to the liver, which is the fundamental source of all the natural spirits; whereby nature would be exhausted and

³⁵ This version starts in the middle of the work and finally reveals the part of the beginning.

³⁶ "He it is who has ordained times"; i.e., times of sickness and also, no doubt, times of healing. But the author is thinking of the plague and has in mind עתות בנדה of Psalms 9 and 10.

³⁷ טיפולא, Ditellus or Titillium of the Arabists Joseph Hyrtl: *Das Arabische und Hebräische in der Anatomie*, Wien, 1879. p. 64f.

³⁸ This and the following sentence are rather differently turned in the French version, which omits the characterization of the liver as "the fundamental source of all natural spirits".

destroyed. The liver too discharges it into the groin. So also does the brain [to its emunctory].

THERAPEUSIS

(*Fol. 99, verso.*) By these following symptoms the physician may recognize these diseases and whence they arise. If the symptom is seen in the arm-pit the cure is to bleed speedily from that vein of the heart which is called *median*³⁹ on the same side and not the one opposite. For through bleeding on the opposite, two inconveniences⁴⁰ arise; the first that it empties out the good blood which has not yet been harmed, and the second that the poisoned blood⁴¹ crosses over by the sound channels and poisons the sound parts.⁴²

If it be in the liver, then bleed the *basilic*⁴³ vein of the right arm; that is from the vein of the liver or from the vein of the arm which is called *salvatella*,⁴⁴ and which lies between the little finger called *Zeretb* and the ring-finger called *Qemişab*.

If these superfluities travel within the body towards the groin⁴⁵ and the membrum virile—that is the male member—and towards the *glandular*⁴⁶ surfaces of the groin, then bleed the vein of the foot on the same side—that is between the big toe and the next. For if you bleed from the arm on that side you bring up the poison to the noble organs, that is the upper organs. And this would be a grievous error, for you would increase and not abate the plague.

(*Fol. 134, recto.*) But if the symptom is far removed from the membrum virile, then

open the vein of the foot which is called *sapbena*,^{46a} near to the little toe and the next. Or else apply cupping-glasses to the legs close to the ankle.

If [the symptoms] appear in the parts belonging to the brain, at the back of the ear or at the throat, bleed on the same side from the *cephalic*^{46b} vein, which is above the middle or *median*^{46c} [vein], or in the hand between the thumb and the first finger.

Make deep (?) scarifications and [apply] cupping glasses in order to remove the poison from the principal members. (*Fol. 100, recto.*) Strengthen nature with cold cordial electuaries, such as the following: Take powder of *diarrhodonne*, *abbatis*, *dragaganth*, *triasandal* and powder of [?] *litharge*,⁴⁷ together with *sucrum rosarum*. The powders to be taken day and night.⁴⁸

The diet must be meager and the patient feed on small fowl and occasionally eat small fish roast on a griddle,⁴⁹ and also green grapes. Tisane,^{49a} too, is beneficial. If there is severe thirst give cold water and vinegar well mixed, and occasionally it is good to give a little more food and some pure white wine well mixed.⁵⁰ On the affected spot put this unguent: Take *trimitina*^{50a} 4 ounces, seed of *ru*^{50b} 1 ounce, root of *calamintb*^{50c} and *sambucus*^{50d} of each 1 drachm, root of *semerion*^{50e}—which is a kind of parsley—5 drachms. Pound them all to-

^{46a} ספבנא transliterates *sapbena*.

^{46b} מידואה transliterates *cephalica*.

^{46c} מידואה transliterates *media*.

⁴⁷ ליטוריא transliterates *lithuria* for *litharge*.

⁴⁸ A second recipe is omitted in the Hebrew translation.

⁴⁹ גראטולא transliterates *graticula*.

^{49a} טישאנה transliterates *tisane*.

⁵⁰ The Hebrew translator omits the contingency: "If the patient presses with instancy for wine." The recipe again is not identical in the various versions.

^{50a} טרימיטנא transliterates *trimitina*.

^{50b} רואה transliterates *ruta*.

^{50c} קלמינטב transliterates *calaminta*.

^{50d} סמבוקא transliterates *sanbucu* for *sambucus*.

^{50e} סמיריאן transliterates *semerion* for *semerion*.

³⁹ קמפני transliterating *commune*.

⁴⁰ אינקונבניאנסיות transliterating *inconveniences*.

⁴¹ אישון perhaps transliterates *issue*.

⁴² The explanatory passage lines 16-19 of the French version is omitted in our translation.

⁴³ בסיילא transliterating *basilica*.

⁴⁴ סלואטא transliterates *salvata*.

⁴⁵ אינגוילא transliterates *inguila* for *inguina*.

⁴⁶ גלאנדא transliterates *glandula*. Perhaps meaning inner? Cf. French vers. fol. 99v., line 21.

gether with oil of *camomile*^{50f} and a little wax, pitch (here רמיוקא of the text is left untranslated) and *resin*.^{50g} Make a little stiff unguent and apply to the spot three or four times a day. This plaister draws out the poisoned matter from the humours so that they do no harm to the principal members. Sometimes *galbanum*^{50h} is added.

There is another tried and excellent powder for this, and one which is of greater benefit than *theriac*.⁵⁰ⁱ It is (Fol. 100, recto, line 30) called amongst the infidels⁵¹ "the Emperor's powder", which the Arabian emperors used in times of plague and also against all venom and poison and against snake bite and against any poison in the world. It is called in Arabic, *Zinwar*^{51a} meaning "The Deliverer from Death." This powder is compounded of the herb *palamenon*,^{51b} that is [?] *tigice*^{51c}, from another herb called *philadia*^{51d} (some call it *osilla nigra*,^{51e} others call it [?] *gentian*⁵² and still others clove⁵³)—some suggest *turmintella*^{53a} or (here אפסימן of the text is left untranslated) *latipbaron*,^{53b} or *bola armenic*,^{53c} or *terra sigillata*. It can be said of all these herbs that they are most *beneficial*^{53d}; they repel all poisons injurious to mankind and against snake bite, also (Fol. 134, verso) they are helpful. If they are

^{50f} קמובילא transliterates *camomila*.

^{50g} רסינו transliterates *resin*.

^{50h} גלבנו transliterates *galbana*.

⁵⁰ⁱ אפריאקה transliterates *atbriaca*, the Arabic form of *theriaca*.

⁵¹ אינפידילי transliterating *infidels*. The French version describes the powder as used by "li imperial des pay (n)s", the emperor of the pagans.

^{51a} זינאר

^{51b} פלומינון transliterates *Palamenon*.

^{51c} טיגיצא transliterates *tigice*.

^{51d} פילאדיא transliterates *philadia*.

^{51e} אווילא קרוא transliterates *osilla cruda*.

⁵² גינטיאנה transliterates *gentiana*.

⁵³ טירמינטילא transliterates *giroflata* = *giroflée*.

^{53a} טארמינטילא transliterates *tormentilla*.

^{53b} לאטיפרון transliterates *latipbaron*.

^{53c} בולו ארמניקו transliterates *bola armenica*.

^{53d} גראסיוקיסמו transliterates *gracia, graciocissimo*.

taken internally or applied to the affected spot they draw out the poison as blood is drawn out by bleeding. This has been proved often and by many people; and although the men who understand these herbs have died out, there are said to be some people still in *Leotida*^{53e} (*Liège*) who understand the herbs.⁵⁴

ASTROLOGICAL EPILOGUE

(Fol. 100, verso, line 15.) Others say that the cause of the pestilence is the conjunction of Saturn with Jupiter and other planets which came into conjunction in the past year. But the real cause is the conjunction which occurred in the year 22;⁵⁵ from which there are still effects remaining. For in the course of time many evils will still be brought about by these stars, such as famines, plagues and dearth.

POSTSCRIPT⁵⁶

(Fol. 101, recto, line 8.) The remedy mentioned should be carried out speedily and there should be no delays after the time we have mentioned, and the bleeding should be done from the places mentioned.

If it be impossible to carry out the bleeding immediately, at least do it within six hours, that the poison may not penetrate and strengthen its hold. The patient must refrain from food and drink until the phlebotomy is performed, but after it they must be taken together with cordial remedies that he may gain strength.

(Fol. 101, verso, line 13.) We have noticed, and it is a fact proved by our experience

^{53e} ליוטידיא transliterates *Leotida*, cf. Latin *Leodia*.

⁵⁴ Cf. in French version the "apothecary in *Liège*".

⁵⁵ A marginal gloss in the same hand as text emends "22" to "52". This, without Steinschneider's emendation would give the year 1292. See above, note 29.

⁵⁶ Both the Astrological Epilogue and the Postscript are shortened in the Hebrew translation and vary somewhat from the Latin and French versions.

over a long period of more than twenty years in which this change [in the position of the planets] has taken place in these [pestilential] districts, that a great number of cases are cured by phlebotomy alone. For the poisonous matter is by this method expelled, the vitality aiding to evacuate the evil matter; and the heart also endeavours to evacuate the evil from the body. This evacuation of the poisonous matter relieves him [the patient] and he is thereby delivered from the pestilence.^{56a}

PROPHYLAXIS ⁵⁷

(*Fol. 98, recto, line 23.*) It is necessary to be sparing in food and drink, avoid frequent bathing and heavy labour and all such things that open the pores in the body. For when they are open the heated ⁵⁸ air easily penetrates, and so the vital and the natural and the animal spirits are dissipated and decayed. Fruits must be avoided except they be acid, and at all costs coitus must be avoided, for it weakens the heart.

Take easily digestible foods and aromatic wines. Avoid confections and particularly such that contain honey, and all dishes should be seasoned ⁵⁹ with strong vinegar.

In cold weather and on rainy days a fire should be lighted in the bed-chamber. In summer the patient should eat something in the morning before rising and afterwards go out into the open air.⁶⁰ He should take aromatic (*Fol. 98, verso*) remedies such as

diabra, diamusk and [?] diacodi. If he is poor let him use cloves, nux muscata and mace, and once or twice a week some theriac. He should carry in his hand a pomander or other (*Fol. 135, recto*) fragrant substance and smell it frequently.

In the evening ⁶¹ he must return home speedily and go close to the fire, throwing upon the coals some fragrant wood or of the following powder: Take of olibanum and storax 1 ounce, of storax and mint 2 drachms, of aloe-wood 1 drachm. Put it on the coals and it will produce a smoke. Let him do this also when he perceives an evil odour. And, by the help of God, if he act in this wise. . .⁶² In summer he must take much vinegar and green grapes—he must not use hot spices. If in the morning he is warm or perceives an evil odour, then let him make a practice of smelling roses, violets, cloves, sandal-wood and aloes. Also he should hold a sponge dipped in vinegar to his nostrils when the weather is hot.⁶³

⁶¹ French version "a lentree du lit."

⁶² The copyist has omitted a line here, probably through "homoioteleuton". It no doubt began: "in time of cold", as in the French which runs (*Fol. 98 verso, line 15 ff.*): "alaide de dieu en temps froit bruyneus, on corru(m)pu effect de mauvais accide(n)t pourra estre preseruez".

⁶³ This passage is briefer than in the French and Latin versions which, however, do not mention the sponge dipped in vinegar. The use of this device was common. Our translator may have utilized here the popular plague treatise of Bengt Knutsson (two Latin editions of this work are believed to have been printed by Gheen, Antwerp, 1485 and a third by Arnaldus de Colonia, Leipzig, 1495). Two English translations are ascribed to Machlin, London, 1480, another to the same publisher dating from 1483 (reprinted by Jan van Doisbosih, Antwerp, early in the 16th century) while another was published by Wynkin de Worde, about 1510. Many of these editions have survived only in fragmentary copies, but one of the Machlin editions of 1480 has been reprinted from a copy in the John Rylands Library at Manchester: Guthrie Vine "A Litel boke . . . for . . . the . . . Pestilence": John Rylands Facsimile 3, Manchester, 1911. See also Dorothea Waley Singer, *loc. cit.*, pp. 183-185.

^{56a} A marginal gloss in the same hand as text gives אִינְסִיטוֹ, which Dr. Cowley suggests is perhaps a transliteration of *infesto*.

⁵⁷ We here revert to the passage on Prophylaxis, with which this version closes. It will be observed that it is a portion of this passage of which MS. Fonds Hébreu 1191 (viii) provides a version.

⁵⁸ חֲמוּם no doubt copyist's error for שָׂחִים "poisoned."

⁵⁹ קִנְדִּיּוֹס transliterates *conditi* = prepared. Cf. קִנְדִּיּוֹס = *conditum*, spiced wine or spice to put into wine (condiment).

⁶⁰ This sentence does not occur in the French or Latin versions.

He must avoid onions, garlic and leek, but parsley and cinnamon are allowed him, for they are not excessively hot. (*Fol. 99, recto.*) It is good to drink cold water with vinegar and also to drink tisane, for it is of great benefit to people of a hot dry nature.⁶⁴

The house should be sprinkled several times a day with cold water mixed with vinegar and rose-water. Pills of Rhazes too are of great good taken once a week. They are beneficial to all complexions of men and at all seasons. Avicenna and all the other authors praise them greatly. They disperse all corrupt matter and their formula is:—

Take cicotri aloes 3 drachms; myrrh and saffron of each 1 drachm; make into a paste with syrup of fumo terra 1½ drachms, and form into pills which should be taken in the evening before sleeping.

TRANSLATOR'S EPILOGUE

And if a man, with God's help, employ the means which I have set forth he will stand secure in a season of pestilence.

This treatise was completed here, in the year⁶⁵ one thousand three hundred and ninety-nine by Maestro Giovanni of Cenobarba. And this reckoning is according to the reckoning of the Nazarenes.

APPENDIX I

Early Evidence for the Former Existence at Liège of the Tomb of the Author of The Travels of Sir John Mandeville

The epitaph from the Liège tomb is transcribed by Abraham Ortelius and Joannis Vivianus, "*Itinerarium per nonnullas Gallicæ Belgicæ partes*," Antwerp, 1584, p. 15,

⁶⁴ The Hebrew version here omits the warning that a sensation of "pricking or motion in the blood should be treated by instant phlebotomy" "on the same side and in the nearest vein."

⁶⁵ No other version we have encountered gives this date. The usual date is 1365. The treatise "in 4 chapters" of "John of Bordeaux" especially current in England, usually bears the date 1390.

and in the poem addressed to the Archduchess Mechtild of Austria in 1462 by Jacob Püterich and published from a sixteenth century manuscript of Herzogenburg by Moriz Haupt, in *Zeitschrift für deutsches Alterthum*, Leipzig, 1848, p. 55. Both Ortelius and Püterich give detailed descriptions of the tomb and of the coat of arms which it bore. These arms have been traced by G. F. Warner to two families, the Lamonts and the Tyrells or Tyrrells, of counties Somersetshire, Herefordshire and Hertfordshire. Possibly our hero had seen the arms of the Hertfordshire family at St. Albans. The epitaph on the tombstone is also quoted by Pits, who says it was sent to him by the English priest Edmundus Lewknerus, who saw it before his death in Liège. See John Pits, "*Relationum Historicarum de Rebus Anglicis*," Paris, 1619, vol. 1, p. 511. John Weever, "*Ancient Funeral Monuments within the United Monarchie of Great Britain, Ireland and the Islands Adjacent*," London, 1631, found (p. 567) an epitaph to Mandeville in the church of St. Albans, and a legend current of his burial there. He explains that he has himself seen the tomb at Liège with the epitaph. The epitaph in our text is here given verbatim from Pits. Ortelius and Weever give the date 1371, but almost all later references confirm the "1372" of Pits and Püterich. Püterich, however has also modified the name and title to "Monteuilla" and "Compredi". The only other differences in the versions of the epitaph that we have seen are the omission by Ortelius and Weever of the word "suorum" after "bonorum". The various abbreviations, etc., in spelling we have ignored.

Mandeville is mentioned as *an eminent physician* and great traveller, buried in the Guillelmitte convent at Liège, by so early a writer as Radulpho de Rivo, Dean of Tongres (ten miles from Liège), who died in

1403. See Joannes Chapeauville, "Gesta Pontificum Leodiensium, scripserunt auctoris precipui", Liège, 1616, vol. 3, p. i. (For the life of Rivo see P. C. Mohlberg, "Radulph de Rivo: der letzte Vertreter der altromischen Liturgie", Louvain, Paris and Brussels, 1911.) De Rivo gives the date of the tomb as 1367, a mistake explained by Warner as probably due to the easy confusion between a Latin X and V, supposing the real date to have been 1372. Similar references to our author are given by Cornelius Zantfliet, monk at the convent of St. Jacques at Liège, in his "Chronicon ab anno 1230 ad 1461", edited by de Louvrou and published by Martene and Durand, "Veterum scriptum et Monumentorum, documentorum, moralium, amplissima collectis", vol. 5, p. 67; John Bale, "Illustrium Maioris Britannicæ Scriptorum" (Ipswich?), 1548, Centurion iii, p. 149b; Jacob Meyer, "Commentarii sive Annales rerum Flandricarum", Antwerp, 1561, Lib. xiii, p. 165; Lodovico Guicciardini, "Descrittione Di Tutti i Paese Bassi Altrimenti detti Germania inferiore", Antwerp, 1567, p. 281c; F. X. de Feller, "Dictionnaire Historique", Liège, 1781, vol. 4 p. 329 (quoted by Hénau; we have ourselves seen only the edition of Paris and Lyon, 1822, vol. 8, p. 395); P. Lambinet "Recherches sur L'Origine de l'Imprimerie Brussels, ann. VII de l'ère française", p. 299.

J. Leland, "Commentarii de Scriptoribus Britannicis", Oxford, 1709, p. 366, has a lengthy notice of Mandeville. He does not give the name "ad Barbam" but describes the knight as "ex fano Albani oriundus". He says that he studied first theology, then medicine, and that finally, owing to his thirst for knowledge, he became a great traveler. Leland devotes much space to praise of this latter pursuit.

R. P. Foullon, "Historia Leodiensis . . . ab origine populi usque ad Ferdinandi Bavari tempora", Liège, 1735, vol. I, pars. 2, lib. 5, p. 436, mentions "Mandevillium,

Equestris Ordinis Anglum nobilem, vivis excessisse Leodii, Sepulcrumque in Suburbana Guilielmitarum Aede elegisse, scribit Radulfus". He corrects both Rivo and Ortelius as to the date, commending the greater accuracy of Guicciardini; also he notes the sentence carved "in the dialect of Liège as used to this day".

APPENDIX II

Paris, Bibliothèque Nationale Fonds hébreu 1191 (VIII), (Ancien Fonds 404) folio 141, verso

	מאמר נכבד מאד בעפוש	
	האזיר והדבר.	
	אמר המחבר האזיר בשבבר ימים רבים	
	הוא מעופש ונעשה אזיר	
5	מגפ. אמנם איני אומר שהאזיר יתעפש	
	בעצמותו	
	כי הוא דבר פשוט אבל בעבור האידים שנתערבו	
	נקרא אזיר מעופש. ונמשך מזה מגפה בהרבה	
	מדינות ועדן נשאר בהרבה מקומות עקבות ה'	
	המגפה כמו שנראה כי הרבה אנשים יומתו אשר	
10	הם מליאים ליחנות רעות כי לא האזיר המעופש	
	לכד טבה לדבר אבל בעיווק הליחות הרע'	
	שמואים	
	האנשים המתים כמו שמעיד גלגוס בספר	
	הקדח'	
	וזה לשוני דע כי לא יקבל האזיר שום עפוש	
	אם לא	
	שיהיה תומר הגוף מוכן לעפוש או שיהיה מונח	
15	תחת הדבר המעופש. כמו שהאש לא ישרף	
	אלא	
	החמר המוכן לשריפה. כמו כן האזיר המגפיי	
	לא	
	יוק כגוף אם לא ימצא החומר מוכן לעפוש.	
	אם כן	
	הגופים ה' הנקיים הכלתי מבנים ההרקות	
	עומדים	
	בריאים. וכן עומדים בריאים האנשים אשר	
	מוגם	
20	הפכים למוג האזיר המשתנה שאם לא כן באיזה	
	מקום שיהיה האזיר המגפיי יחלו האנשים וימותו	
	כי האזיר כי מעופש לפי התחדשות הליחות	
	יחדש	

חליים מתחלפים. כי לעולם הפועלים פועלים
לפי הנתת החומר המתפעל. ולפי שהם
רבים הרופאים הפועלים בחכמה ובמלאכה
מעט מורגלים. ומחכמת התכונה עממים ומשו
ללים. כי החכמה היא הכרחית מאד לכל
רופא

פישוקי כמו שאמר אבוקרט בספר האפידמי ש'
שאינו שזה כלום הרופא המשולל מתכונה ואין

(fol. 142, recto)

ראוי לאדם שירפא על ידו כי לכוש חכמת
התכונה
ומלאכת הרפואה מיישרים זה את זה והחכמה
האח'

מונחת הרבה החות מהחכמה האחרת כי כל הד
ברים לא יתבארו ככל הדברים. וזה כחנתי
מתעסק

ברפואה מ' שנה או יותר כי התרופה הנתונה
במ

בט הפכוי אעפ"י שהיא בדרך המלאכותיי
מורכבת

ומסודרת כהונן לא היתה פועלת לפי כונת הרופא
ולא לתועלת החולה. זאת לדעת אם נתנן
הרפוא'

לשלשל הנה החולה יקיא אעפ"י שבטבעו לא
ימאס

הרפואה. אם כן מי שלא שתה מימי התכונה
ובפרט

בחליים המגפיים לא יוכל לעזור לחולי. כמו שאמ'
שר הרופאים איך אוכל לרפאת אם לא אדע סבת
ה'

החולי. וגם בן סיני ברפואת הקדחות אמ' מי
שלא

ידע הסבה נמנע לו הרפואה ברפואת החולי.

וזה גם כן ירצה אכן רשד כשמע שאומר
שהידיעה

היא הכרת סבות הקדחות והרחוקות. אם כן
מאחרי שהדברים השמימיים יהיו מהסב' הראשו
נות יצטרך לבא אל הכרת הדברים ההם. יראה

אם

כן שבולת התכונה לא ישוה דבר הרפואה ולזה
ב'

בחסרון העצה ינוצחו רבים. ולכן אני

ג'ואן דבורגוניא ממגרש ליאונש אומן בחכמת
הרפואה היותר קטן שברופאים זה לי ימים

בתחלת

המגפה הזאת שהיתה שנת כ"ב לפ"ק הנה
במחוזנו

עשיתי חבור קטן מתכונה עם חבורי זה מהסבות

והטבע שזאת המגפה ורבים לקחו פתשגן ממנו
ומתחיל כן אלי אלי וכו'. ובראותי כי זאת
המגפה שבה מחדש ובהמשך הזמן עתידה
לשוב פעם אחר פעם כי לא הגיע קצה לזה. ואני
ברואי על מיתת האנשים ובוסף בבחינת
תיעלתם חברתי ז'

(fol. 142, verso)

זה החבור וקראתי עיור אלהי. דעתי לבאר בו
השילוח'

והרפוי מאלה החליים בשלימות יען כמעט לא
יחסר

לאדם רופא וכל אדם יוכל להיות רופא לעצמו
ושו

מר ונהרר ומנהיג. אם כן תחלה נדבר מההנהגה
הראויה. ומי שירצה לידע כונתי לפי השפעת ה'
הגרמים השמימיים וגם מהעניינים הארציים
יעיין

במאמר הנזכר המחובר על זה. ואני
הקטן באיכות ובמעלה בנימין בר' יצחק

קרקשוני המעתיק בראותי זה הקונדרס סגור
וחתו'

באוצרות מנוסה ומאומת על ידי רופאים נכבדי'
שמתי כל השתדלותי להוציא מתחת ידם
ולהעתיקו

מלשונם אל לשון הקדש יען יהיה לנו לעזר ולתפ
ארת וגם לבאים אחרינו והתהלך לעזור אמן.

ואתחיל בזכרון ההנהגה ואומר..

ראוי להזהר מן מלוי המאכל והמשתה. וכן
ראוי להרחיק המרחץ וכל הדברים המ
ספגים הגוף ופותחים הנקבים כי יכנס האויר המ
עופש דרך הנקבים הפתוחים ונוקב הגוף ומעפש

וכן ראוי מאד להרחיק ממשגל ולהשמר מאכילת
הפירות ואם יאכל מהם יהיה מעט אם לא

מהפירו'

החמוצים. וראוי להרגיל ענינים קלי העכול
ויין

טוב הרוח מווג בראוי. וירחיק כל ריקוח הדבש
ויהיו כל המסעדים מתוקנים בחומץ. ובזמן גש'
נשמי אדיי יעשה אש בחדר משכבו. ובבקר

בקומו
טרם צאתו מהבית או שיעמד במקום האויר

ירגיל
התרופות הבשתיות כמו דיא אמברא דיא

מושק ד'
דיא אנמיש עם מושק פיליריש ארקומיקון עם

מושק
ודומיהם. ואם אין ידו משגת ירגיל גריאופולי

מאשיש נוסף מושקדי זידוארי וזולתם. ויקח
פעם

¹ Read השילוח.

Paris Bibliothèque Nationale, Fonds
hébreu 1124 (Vla) (Ancien Fonds 417)
fol. 133, verso

ובין האצבע שכצדו כי אם תקיז מהזרוע הנה
אתה מעלה הארס לחלקי'
25 הנכבדים ר"ל העליונים ותהיה שגגה רעה כי
תגדיל ולא תחסר הדבר. ואם

(fol. 134, recto)

ואם הסמן יתרחק מהאברים וירילי אז פתח וריד
הרגל הנק' שפינא סמוך
לאצבע הקטן והאחר. או שים בשוקים כוסות
המציצה קרוב לארכובה
ואם יראו בחלקי המוח אחורי האזנים או בגרון
או תקיז מאותו הצד
בצפילקא שהיא למעלה מהאמצעית מידויאה

בלע' או ביד בין
הגודל והאחר. ועשה חכוכים חזקים וכוסות
המציצה ותרחיק הארס
5 ארסמי מהאברים הראשיים וחזק הטבע עם
רקוחים קרים לכבש דהיינו
קח אבק דיאהרודון אבאטיש דיאהלדגנט
מריאה סנדלי אבק ליטוריא
עם זוקרי רושאר וינהיג האבקים ביום ובלילה.
ההנהגה תהיה דקה
וינהיג עופות קטנים ולפעמי' מהרגים הקטנים
צלו' בגראטיקולא

עם הכוסר ויועיל הטישאנה ואם תחזק הצמא אז
10 תן מים קרים עם חומץ
מזוג בטוב ולפעמים כדי לתת מזוג מעט יותר
ותן יין לכן צלול מזוג בטוב
ועל מקום המורסא שים זה התחכושת. קח
טרימיטינא ד' אונקיו' זרע
רומה א' אונקיו' שרשי קלמינטו סנבוקו מא' א'
דרמ' שרש' סניריאון הוא מין
כרפס ה' דרמ' ידוקרו כלם עם שמן קסומילא ועם
מעט שעווה זפת ראישא

רסינו ועשה מעט תחכושת קשה ושים על המקום
15 ד' או ג' פעמי' ביום כי
האספלנית הנז' תמשוך החום' ארסמי מהאדים
שלא יזיקו לאברים הראשי'
ולפעמי' מוסיפים גלכנו. עוד לזה אבק מנוסה
ונפלא אשר יועיל יותר
מהאטריאקה ונקר' בין האינפידילי אבק הקסר
אשר הקיסרים
הערכים היו מרגילים כומן הדבר וגם נגד כל
סם לארס' נגד מחשמי⁶

20 ונגד כל ארס שבועולס ונק' בערכי וינואר מציל
מן המות וירוקח זה
האבק עם עשב הנק' פילומינון דהיינו טיניציא
מעשב אחר הנק' פילאדיאה
ואחרים קורין לו אוזילא קרודא ואחרים קוראים
לו גינסיאנה ואחרים

1 עצה על פי מאיטש' גואן דצינוכארבא על עניין
הדבר. בה'א עתה הוא זמן
אם איהו² יפול בחולי הדבר לסבת רוע הנהגתו
אשר מהרה צריך לתת
לו מזון אשר אלי' החולים הדבריים אחר כ"ד
שעות יתקיימו ולכן צריך
מהרה לתת מזון ורפואה. ואחר שידעת כי בגוף
הארס יש ג' אברים ראשי'³

5 ר"ל הלב והמוח והכבד. וכל אחד מהם יש לו
משפך כמו שידעת אשר בו דוחה
המותרות מן האבר דהיינו מן המוח אחורי
האזנים. ומהלב הטיטילא
ומהכבד האזני' שבגוף מיד מניע וידע כי הארס בסגולתו
ליצר טבע האנושי כאשר
ידעת אתה רואה נשיכת כ"ח ארסמי זה האויר
הארסי מעורב עם הדם
והרוח החיוני שבגוף מיד מניע ללב שהוא יסוד
הטבע שלנו אשר ימיתהו

10 ויכלה. וכשהלב רואה כך מיד מתנועע בכל
יכלתו להרחיק הדם הארסי
למריקו ומחזר הטבע לדחוק בשבילים סגורים
כדי שלא יגיע ללב. ולפעמי'⁴
יפעל לדחוק וישולחו לכבד שהוא יסוד כל
הרחות הטבעיות ויכלה וימית הטבע
והכבד ג"כ ידחהו לאינולאליש. וכן עושה
המות. ובאלו הסמנים יכיר הרופא
מאלו החולים ומהיכן יתילדה. אם יראה הסמן
בטיטילו הרפואה היא

15 מהרה להקז מוריד הלב הנק' אמצעי קומו'ני
בלע' מאותו הצד ולא
לשכנגדו. כי להקזי להפך הצד יתילדו ב'
אינקובינאיניש הא'
כי תריק הדם הטוב שכבר בלתי מזוק. ב' כי
הדם המסומם ליישו בלע'
יעבור במעכרות הבריאות ויסמם המקומות
הבריאות. ואם יהיה
כלפי הכבד או יקזי הבשליקא מהזרוע הימני
דהיינו מוריד הכבד

20 או מוריד היד הנק' סלואילה שהוא בין האצבע
הקטן הנק' זרת ובין
אצבע המכבת הנק' קמיצה. ואם אלו המותרות
ילכו בתוך הגוף כלפי
האנז'ילי וכלפי האברים וירילי ר"ל הזכרות
וכלפי פני הגלגדולי
מהאנז'ילי או תקיז וריד הרגל מאותו הצד
דהיינו בין הגודל מהרגל

² Supply ארס.

³ Read אלו.

⁴ וארס. Read.

⁵ נחשים. Read.

קורין לו גאראופילאטא ואחרים אומ'
טורמיניללא או (?) דיאפטיומ דילא
טיפירון בולו ארמיניקו טיט חתום ויוכל לומ, כי
כל התושבים⁶ הנז' הם
גרסי"א גראסאוססימי וירחקו כל ארס שיוזק
לאדם ולנוק הנחשים

(fol. 134, verso)

1 יועילו או שישתה מהם או שיושם על המקום
ימשוך הארס כמו שימשוך הדם בהוקזה
וזה נוסה כמה וכמה פעמי' ולרכים ואע"פ קי
מתו המכירים העשבים הנזכרי'
אומ' כי נמצאו עדיין בליאטידא שמכירים
העשבים הנזכרים. ואחרים אומ'
כי סבת הדבר חבור שכתאי עם צדק וכוכבים
אחרי' שנתחברו בשנה שעברה
ייקרה⁶ מחבורם שנעשו משנת כ"ב^{6b} כי עדיין
מותות יש אשר עדיין מהכוכבי'
רעות רבות באורך הזמן מסככים רעבונות
ומנפות ויוקר. והרפואה הנז'
ראוי שתעשה מהרה ובלי שום התמצעות מזמן
ראוי שיוקז כמו שאמרנו
ומהמקומות שאמרנו. ואם לא תוכל לעשות כל
כך מהרה לפחות עשה
קודם שייעזר כדי שהארס לא יכנס ויתחוק
בפנים. ויתחוק החולה
ממאכל ומשתה עד שתעשה ההקזה ואחר זה
עם רפואת לביות מחוק
החולה. והנה ראינו והוא ברור כי היה זמן רב
והרי הוא יותר מעשרים
שנה שהיה השנוי באלו הגלילות והרבה מאד
ראינו שנתרפאו בהקזה בלבדו
כי החומר הארסי על זה הדרך יצא כי הכח
מסתייע לגרש החמ' הרע.
והלב מתחוק רק לגרש הרע מן הגוף ומגרש רק
הארס הנפסד בחוץ להעלה⁷
עצמו ולהצילו מן הדבר. הנהגה ראוי
שתהיה במאכל ובמשתה ולהרחיק
המרחץ והטורה המרובה וכל הפותחים נקבי
הגוף כי כאשר
יפתחו בנקלה האויר מחומם יכנס פנימה וחרוז
החיוני והמכעי והנפשי
יתמסמם ויתעפש. פירות כלם ירחקו לבד
אם יהיו פירות המוצים ושירוחק

המשגל על כל פנים כי יחליש הלב. יורגלו
מאכלים קלים להתעכל. ויין ריחני
20 יירגל. ירחקו הרפואות⁶ ואותם שיכנס בהם
הדבש. כל התבשילין יהיו
קונדימי עם חומץ חזק. בזמן הקור ובימות
הגשמים יעשה אש בחדר
המטה. ובקיץ בבקר קודם שיקום ממטתו יאכל
איזה דבר ואחר ילך
לאויר העולם וירגל הרפואות ארומטיקי
דיאברא דיא מוסקו דיאה
אקורי ואם הוא עני ירגיל גירופלי אנוז מוסקדה
ומאציש. ופעם אחת
25 או שתים בשבוע טריאקה. ויולך בידו תפוח
מאמברא ומעניינים ריחניים

(fol. 135, recto)

1 ריחניים ויריה תמיד. בערב יחזור מהרה לבית
וילך אצל האש וישליך על
הגחלים עצים ריחניים או מזה האבק קח א'
אונקי' מאוליבאני אשטוראשיש
קלאמינטה מא' ב' דרמ' עץ אלואי א' דרמ'.
ושים על הגחלים ועשה עשון וכן
יעשה על זה הדרך כאשר ירגיש ריח רע. ובעזרת
השם אם יעשה כאלה הדברי'
5 ובזמן הקיץ ירגיל רב חומץ וכוסר. לא ירגיש
בשמים חמים. ואם בבקר הוא חם
או אויר רע הריח או ירגיל להריח הורדים
והאוינאולש גירופלי סנדילי אלואי
וספוג עם חומץ יחזיק בנחירים בזמן החום.
וירחיק הבצלים והשישמים.
והכרתי הכרפס והקנמון ויכל להרגלים בעבור
אינם חמים מאד. לשתות
מים קרים עם חומץ טובים. וטוב לשתות
המישאנה כי הרבה יועיל לבעלי
10 הטבא החם היבש ויצלף הכית עם מים קרים
וחומץ ומי ורדים כמה פעמים
ביום. וגם הפילולי ראצי' טובים מאד להרגלים
פעם אחת בשבוע ויועילו לכל
מזג האדם והם טובים לכל זמן ואב"ם וכל שאר
המחברים משבחים אותם
הרבה. ישלשלו כל חומר נפסד. אשר נסחתם
זה קח אלואי סיקוטרי
ג' דרמ'. מירה כרכם מא' דרמ' לוש עם שרופו
דפומטורא א' דרמ'
15 וחצי ועשה פילוליש ויחקו בערב קודם שישן.
וכאשר יעשה זה כע"ה
עם העניינים שזכרתי ויכל לעמד בזמן הדבר.
נשלם פה זה המאמ' בשנת אלף ושצ"ט על פי
מאיט' גואני דסינוברא
וזה החשבון הוא לחשבון הנוצרים.

⁸ Read הרקוחות.

⁶ Read העשבים.

^{6a} Marginal gloss in same hand as text; וקרה.

^{6b} Marginal gloss in some hand as text: נ"ב.

See note 29 and 55 of the translation.

⁷ Marginal gloss in same hand as text: אינסיטו.

See note 56a of the translation.

THE MEDICAL PHRASES OF VICTOR HUGO*

By HUBERT ASHLEY ROYSTER, M.D.

RALEIGH, NORTH CAROLINA

LITERATURE is not lacking in medical characters: many great writers of drama and fiction have introduced doctors into their narratives. The doctors of Shakespeare and of Dickens have furnished themes for interesting studies, while much of Molière's satire is heaped upon the doctor and his foibles. In the stories of innumerable lesser writers of fiction may be found physicians as major or minor characters; some play the parts of heroes, others the parts of villains. In each instance the authors display more or less knowledge of doctors and familiarity with their work, according as they have had opportunity for personal observation of or association with them. Usually scant justice is done the doctor in his attitude and service, but, on the other hand, much effort at mock heroics is wasted in attempts to give him more than he deserves. The average fictionist is glaringly ignorant of medical men and their ways and even more so of medical science itself. The hero or heroine is still dying of "brain fever," and peculiar pathology is often developed from sensational injuries.

Conversely the comparatively few physicians who have gone in for literature rarely use their works for displaying their professional learning. It appears certain that Keats and Goldsmith actually avoided medical ideas, if, indeed, they had many; and very little of the best thought of Holmes and Mitchell contains medical allusions.

In lay literature one author—Victor Hugo—stands forth supreme in his medical knowledge. Yet not one of Hugo's leading characters is a physician. He makes no attempt to portray the personality of the

doctor. He merely writes into his works his wide and accurate knowledge of the whole science of medicine. An astounding mastery was his of every branch of science as it existed both before and during his day; his books fairly teem with evidences of it. Most of his medical expressions are in the form of figures of speech.

It is not uncommon, however, for speakers and writers to employ medical similes; now and then they add strength to the ordinary discourse and enliven the usual occasion. The ability to use such expressions wisely and well constitutes an art, even if it does not attest a profound knowledge of medical subjects. But when one illumines one's pages over and over again with deep-rooted ideas of all that pertains to a great science, as Hugo does, it is nothing short of genius. And genius he was in the truest measure of the term.

There was apparently nothing in Victor Hugo's early life or his education to give him such knowledge, except that in the year 1818, in a general yearly competition of all French scholars for University prizes, he obtained fifth place for physics. At sixteen he left the school for good, determined not to try for admission to the *Ecole Polytechnique* or to be a soldier, as was his father before him. Instead, he began to write. We know also that he began to read widely; only omnivorous reading can account for his omniscient writing. At least I shall claim that he read greedily and remembered tenaciously all science, and medical science in particular, for without this preparation he could hardly have set down the wonderfully true and interesting scientific observations which enrich all his works. Whether in figure of speech, running illus-

* Read at a meeting of the Harvard Medical History Club, Boston, Mass., April 4, 1917.

tration or homely simile, the details are perfectly presented and the meaning is exact.

My purpose, then, will be to pass in review the phrases which give evidence of the profound medical knowledge of this man of letters and of his artistic perception in weaving this knowledge into his narrative. Let me hope that my account may not be a tiresome catalogue of quotations.

Beginning with the fundamentals, let us first find the *anatomical* references. With his wonderful power of description Hugo refers to "a row of great piles set upright in the sand against a wall" as "dry, gaunt, knotty logs resembling an array of leg bones and knee-caps afflicted with ankylosis." Indeed he carries the figure further and suggests that "revery . . . might inquire to what race of men these three-fathom tibias had belonged." One of his philosopher characters (Combeferre in "Les Misérables") is said to have been "enraptured with a lecture in which Geoffroy Saint-Hilaire had explained the double function of the exterior carotid artery and the interior carotid artery, one of which supplies the face, the other the brain." This same philosopher was said to believe in "the suppression of suffering in surgical operations." Anatomical figures are vividly set out in the experience of children hidden in the elephant of the Bastille: "Above a long dusty beam, from which projected at regular distances, massive encircling timbers representing the vertebral column with its ribs, stalactites of plaster hung down like the viscera, and from one side to the other huge spider webs made dusty diaphragms." Similar anatomical description is seen in this passage from "The Toilers of the Sea": "Over his head was a roofing not unlike the insides of a vast skull; the vault was the cranium; the arch was the mouth; the eye sockets were lacking. . . . The vault with its cerebral lobes, and its crawling ramifications, similar to outspreading nerves, had a tender reflection of the chrysoprase." In

one of his letters he calls the Strait of Mau-musson "one of the navels of the sea"; and in proving how divinity adheres to the "rough draught" he shows "how the solar ray is an umbilical cord," how the "disfigured becomes transfigured." Walking the corridor of a dungeon gives rise to a comparison: "This gut made circuits; all entrails are tortuous, those of a prison as well as those of a man. . . . The stone pavement of the corridor had the viscousness of an intestine."

Hugo exhibits his peculiar talent in no way better than in his strictures upon the destruction of the marvelous art of the Middle Ages by modern architects. "They have," he says, "audaciously adjusted, in the name of 'good taste,' mounds of Gothic architecture, their miserable gewgaws of a day, their ribbons of marble, their pompons of metal, a veritable leprosy of egg-shaped ornaments. . . . Three sorts of ravages today disfigure Gothic architecture. Wrinkles and warts on the epidermis; this is the work of time. Deeds of violence, brutalities, contusions, fractures; this is the work of the revolutions from Luther to Mirabeau. Mutilations, amputations, dislocations of the joints, restorations; this is the Greek, Roman and barbarian work of professors." Bemoaning the fate of the "charming little bell tower" of the Cathedral, he tells us that "an architect of good taste amputated it and considered it sufficient to mask the wound with a large, leaden plaster, which resembles a pot cover."

Our author's familiarity with *physiology*, *pathology*, *chemistry* and allied subjects is striking. Here is a contrast between pathology and anatomy: "The simplicity which is short-winded is a case for pathology. A hospital ticket suits it better than a ride on the hippogriff. . . . I admit that the hump of Thersites is simple; but the pectoral muscles of Hercules are simple also. I prefer this simplicity to the other." How does the logic of the following physiological chemico-pathological study appeal to

you? It is selected from the postprandial remarks of a reveller: "Now listen attentively! Sugar is a salt. Every salt is desiccating. Sugar is the most desiccating of all salts. It sucks up the liquids from the blood through the veins; thence comes the coagulation; then the solidification of the blood; thence tubercles in the lungs; thence death. And this is why diabetes borders on consumption. Crunch no sugar, therefore, and you shall live." In 1862 through the mouth of Grantaire, who is "perfectly boozy," Hugo gives vent to this strange physiology of the nations: "If I do not admire John Bull shall I admire Brother Jonathan then? I have little use for this brother with his slaves. Take away 'time is money,' and what is left of England? Take away 'cotton is King,' and what is left of America? Germany is the lymph; Italy is the bile. Shall we go into ecstasies over Russia? Voltaire admired her. He admired China also. I confess that Russia has her beauties, among others a strong despotism; but I am sorry for the despots. They have very delicate health." Did this keen observer have any inkling then of the greatest world crisis now at its acme? Speaking in "*Les Misérables*" of the grosser interests of certain states, he hits the nail squarely: "Sometimes the stomach paralyzes the heart. The grandeur and the beauty of France are that she cares less for the belly than other people; she knots the rope about her loins more easily." The physiology of digestion was a favorite theme of illustration with Victor Hugo. Of a shipwreck scene he says that "the deck underwent the convulsions of a diaphragm, which is seeking to vomit." Ursus cries: "I have toiled today, empty stomach, plaintive throat, my pancreas in distress, my bowels ruined, far into the night my recompense is to watch another eat." Gringoire, the impecunious man of letters, thus figures the King: "He is a sponge, to soak money raised from the people. His saving is like the spleen which

swelleth with the leanness of all the other members." Then there is this illuminating antithesis: "The foreign war is a scratch one gets on the elbow; civil war is the ulcer which eats up the liver."

Hugo's chemistry comes in for its share in his figures of speech. He is not very complimentary to the products of the metropolis when he writes: "The mud of Paris is particularly stinking; it must contain a great deal of volatile and nitric salts." Then a glimpse of cloacal chemistry: "Death in the mire under a cover! the slow stifling by the filth, a stone box in which asphyxia opens its claws in the slime and takes you by the throat; fetidness mingled with the death rattle; mire instead of sand, sulphuretted hydrogen instead of the hurricane; ordure instead of the ocean." The grandeur of scenery is used to bring out further details: "The oxides of the rock had placed here and there upon the cliffs red patches resembling pools of clotted blood." The toxicology of character is expressed when he makes Gilliatt say: "I test the quality of a scoundrel as a doctor will test a poison."

For true science this great man had the profoundest respect, but he could not conceal his utter disdain for all spurious and quasi-forms of learning. Satire and ridicule were effective weapons in his hands. All through his monograph on Shakespeare, in which he hales into court the world's greatest men, of whatever branch of learning, he gives examples which prove his remarkable acquaintance with the history of science, the real and the sham. He believed that long advances had been made, and quite as confidently looked for more. "Look at the point," he states, "at which spermatology and ovology have already arrived and recall Mariana reproaching Arnaud de Vileneuve (who discovered alcohol and the oil of turpentine) with the strange crime of having attempted human generation in a pumpkin." This is *vivi-genesis* with a vengeance. Were there other "antis" in those

days besides Mariana? In the following passage one can hardly decide whether the author is serious or satirical. At any rate here is an unusual cause of death: "Chrysippus of Tarsus forms an era in science. This philosopher (the same who died—actually died—of laughter caused by seeing a donkey eat figs out of a silver basin) had studied everything, gone to the bottom of everything. . . . He condensed in his brain all human knowledge." But we do definitely perceive, further on, the insight Hugo had into the scientific pretense of his day. "Five hundred years before Jesus Christ it was perfectly scientific, when a King of Mesopotamia had a daughter possessed of the devil, to send to Thebes for a god to cure her. It is not exactly our way of treating epilepsy. In the same way we have given up expecting the Kings of France to cure scrofula." Substituting "eminent specialist" for "god" and remembering that most cases possessed of the devil are afflicted with hysteria, these words have a very familiar sound at this day. Neither have we by lapse of time or more diffuse education entirely outlived those who still believe in the Royal Touch and the laying on of hands—except that the Royal Touch is now frequently given by a famous physician; we have places of pilgrimage, too.

Hugo draws on his knowledge of *digestion* and *dietetics* for an argument against formal, stilted writing. This is his point: "It seems that the only question [with the 'serious' school] should be to preserve literature from indigestion. Formerly the device was 'fecundity and power'; today it is barley gruel.' . . . Be of the temperance society. A good critical book is a treatise on the dangers of drinking. Do you wish to compose the Iliad, put yourself on diet." Again: "He does not stop, he does not feel fatigue, he is without pity for the poor weak stomachs that are candidates for the Academy. The gastritis called 'good taste' does not afflict him." In describing

the choice of subjects for writing by a genius, he asks: "What is the Iliad? A collection of plagues and wounds—not an artery cut which is not complacently described."

In the realm of *internal medicine* and *diagnosis* we find the great author demonstrating the same capacity for critical illustration. What an observant attitude is pictured in this passage: "The pedestrian bathed in sweat finds in this vault [tower rock on the road to the Rigi] an abundance of chilling shade, and a little cool water falling all about him; a treacherous bench has been placed there, and on it pleurisies are in wait!" General manifestations of disease are thus brought into service: "The revolutionary fever, however, was increasing. No point of Paris or of France was exempt from it. The artery pulsated everywhere. Like those membranes which are born of certain inflammations and formed in the human body, the net-work of the secret societies spread over the country." In this connection, when the young men, enthusiastic over the Revolution, were sent about to organize their several branches, Joly, the medical student, was to "go to Dupuytren's clinique and feel the pulse of the medical school." Joly, by the way, was a typically latter-day neurasthenic. He is depicted as a "young malade imaginaire. What he had learned in medicine was rather to be a patient than a physician. At 23 he thought himself a valetudinarian and passed his time in looking at his tongue in a mirror."

Discriminating knowledge of special diseases is constantly exhibited: "There is something of the cholera in that sort of tempest"; and, "The breath of the cholera was felt in those winds"—evidently the prevailing idea of the epidemiology of cholera in those days. With the same figure in mind, Hugo finds the origin of storms: "Tempests are nervous attacks and fits of delirium on the part of the sea. The sea has its sick headaches." A similar figure is employed to explain an unobserved leak

during shipwreck: "They had not noticed it amid the convulsive violence of the wind which had shaken them. In a fit of tetanus one does not feel a prick." Describing the condition of a little child, he thought "a nurse would have reckoned her five or six months old, but she was, perhaps, a year old, for in poverty growth undergoes heart-breaking reductions which sometimes extends to the rickets." The etiology is somewhat mixed, as is the metaphor, but the kernel of knowledge is there. Further along Ursus "listened to the other child eating," and exclaimed: "It will be a task, if I must henceforth nourish this glutton who is getting his growth. He will be a tapeworm which I shall have in the belly of my industry." I dare say that no one could express more clearly the relation of certain degenerative diseases to the life we live than is found in the following paragraph: "His rheumatism came to him about the time when he had gotten into easy circumstances. These two products of labor are fond of keeping one another company. At the moment when one becomes rich, one is paralyzed. This crowns life." The sclerosis of age is well presented in the personification of the cathedral door which yielded but slowly to the attack of the vagabonds; one of them said: "It is old, and its gristles have become bony." The following gives his diagnosis in the crowd: "Persons who wore cravats that hid their chins were called the scrofulous."

A really remarkable excerpt is the one I am now about to quote. Well might we ask, did Victor Hugo know of gall-stones and duodenal ulcer? Portraying a man in the full vigor of life, he says: "This vision is splendid and astounding; but a little gravel in the liver or an abrasion of the pylorus—six feet of earth, and all is over." Not less remarkable is his broad prophecy of fecal infection contained in a longer extract. Did Hugo anticipate Metchnikoff's theory and foresee Lane's operation when he wrote: "The belly being the centre of matter is our grati-

fication and our danger; it contains appetite, satiety, and putrefaction. The devotion, the tenderness which seize us are liable to death. . . . The belly is to humanity a formidable weight; it breaks at every moment the equilibrium between the soul and the body. It fills history; it is responsible for nearly all crimes; it is the matrix of all vices. . . . It is perhaps obesity, perhaps dropsy. . . . The large intestine is king; all that old world feasts and bursts; and Rabelais (doctor and priest) enthrones a dynasty of bellies."

On a lonely journey through the Alps, Hugo wrote letters to his wife. During one of these tramps he had an opportunity to indulge his fancy in speculation on the etiology of goitre. The following quotation is worth reading: "There was one witness in reality, only one. . . . In a cleft in the crag, seated on a huge stone with legs hanging down, was an idiot with a goitre, his body slim and his face enormous, laughing with a stupid laugh. . . . The Alps were the spectacle, the spectator was an idiot. I forgot myself in this frightful antithesis. . . . Nature in her superbest aspect, man in his most miserable debasement. What could be the significance of this mysterious contrast? What was the sense of this irony in a solitude? Have I the right to believe that the landscape was designed for him—the cretin, and the irony for me—the chance visitor? However, the goitrous idiot paid no attention to me. . . . At this height the convexity of the globe confuses to a certain extent all lines and deranges them. The mountains take extraordinary postures. . . . The landscape is crazy. With this inexpressible spectacle before your eyes you begin to understand why Switzerland and Savoie swarm with stunted minds. The Alps make many idiots. It is not granted to all intelligences to cohabit with such marvels and to keep from morning till evening, without intoxication and without stupor, turning a visual radius

of fifty leagues across the earth around a circumference of three hundred."

Materia medica and *therapeutics* form the basis of certain comparisons which were the beliefs of the times. Some of these reflected the serious side of the author. Witness: "Many will remember that great epidemic of croup which desolated, thirty-five years ago, the quarters bordering on the Seine at Paris, and of which science took advantage to experiment on a large scale as to the efficacy of insufflations of alum, now so happily replaced by the tincture of iodine externally applied." On the other hand he takes occasion at times to berate the ignorance both of the physician and of the layman. The archdeacon showed the inscription, "Medicine is the daughter of dreams," to his doctor, who immediately had his ire aroused and exclaimed: "Medicine a dream! I suspect that the pharmacopolist and the master physician would insist upon stoning you if they were here. So you deny the influence of philters upon the blood, and unguents on the skin! You deny that external pharmacy of flowers and metals, which is called the world, made expressly for that eternal invalid called man!" The cleric replied: "I deny neither pharmacy nor the invalid. I reject the physician." "Then it is not true," replied the doctor hotly, "that gout is an internal eruption; that a wound caused by artillery is to be cured by the application of a young mouse roasted; that young blood, properly injected, restores youth to aged veins; it is not true that two and two make four and that emprosthotonos follows opisthotonos." Which being said, the debate ended in surliness on the part of the priest and anger on the part of the physician. But, "Ursus, in his capacity of physician healed, because, or in spite of. He made use of aromatics. He was versed in simples. He took advantage of the profound power which is contained in a mass of disdained plants,—hazel twigs, white alder, guelderrose, the

wayfaring tree, slatern, viburnum, buckthorn. He treated phthisis with sundew; on appropriate occasions he used the leaves of the tithymal, which plucked from the root are a purgative, and plucked from the top are an emetic; he took away your sore throat by means of the vegetable excrescence called 'Jew's ear'; he knew which rush cures the ox and which mint cures the horse; he was acquainted with the beauties and virtues of the herb mandragora, which, as every one is aware, is both male and female. He had receipts. He cured burns with the wool of the salamander, of which Nero, according to Pliny, had a napkin." A more modern example of botanical superstition may be recalled. An old woman, (whether male or female I do not know) once asked the celebrated Abernethy: "Doctor, do you believe that poplar bark scraped 'up the tree' is an emetic and scraped 'down the tree' is a purgative?" "Certainly," replied the doctor, "and don't ever take any scraped around the tree, for, if you do, it will fly through your ribs and kill you." Hugo tells us that Ursus "correctly preferred Galen to Cardan; Cardan, learned man as he is, being only a worm of the earth in comparison with Galen." But in his "Shakespeare" he violently asserts that "a country horse-doctor would not inflict on horses the remedy with which Galen treated the indigestions of Marcus Aurelius." What the remedy was we are left to conjecture.

Obstetric references are few but pointed. The family of nations is thus to be nourished: "France bears within her the sublime future. This is the gestation of the nineteenth century. That which was sketched for Greece is worth being finished by France." The channel islands are described as the "puritanical archipelago, where the Queen of England has been blamed for violating the Bible, because she gave birth while under influence of chloroform." When Dom Claude rails at a fellow by shouting, "What means of safety have you found,

knave? Must your idea be extracted with forceps?", one is at a loss to know whether to classify this metaphor with obstetrics or with dentistry. Idiopathic Cesarean section, amid rather warm surroundings, is thus described: "Under Mary Tudor a mother and two daughters were burned. . . . One of the daughters was with child. She brought forth the child in the coals of fagots. The chronicler says: 'Her belly burst. A living child came forth; the new born infant rolled out of the fiery furnace; a certain House picked it up. [The] bailiff . . . caused the child to be flung back into the fire.'"

Maternal impressions are hinted at when the populace hoots the hunchback of Notre Dame: "The monster! a face to make a woman miscarry better than all the drugs and medicines. . . . 'Twas you that made my wife, simply because she passed near you, give birth to a child with two heads! And my cat bring forth a kitten with six paws!"

Two or three figures of speech must suffice to convince us of Hugo's knowledge of the *eye and its diseases*. Hardly could there be expressed a more beautiful figure than this: "The pupil dilates at night, and at last finds day in it, even as the soul dilates in misfortune and at last finds God in it." Another is keenly suggestive: "He suffered the strange pangs of a conscience suddenly operated upon for the cataract. He saw what he revolted at seeing." Ocular therapeutics is brought into play upon literary diseases: "Let us not, then, be surprised . . . at the poultices applied by a certain school of criticism to the chronic ophthalmia of academies."

It may not be surprising to realize that the great Frenchman was well versed in *surgical science and practice*. He certainly writes of times when surgery was often in demand and when the average citizen was necessarily familiar with its practices. His exact knowledge of surgical pathology is evident. As an introduction Hugo regretted

that "we are deprived of the progress which the executioner caused surgery to make," for "by cutting the limbs of living men, by opening their bellies and tearing out their entrails, they [of the olden days] caught phenomena in the very moment, and made discoveries." Hearing this, let the women rage and the anti-vivisectionists imagine a vain thing. Hugo's phrases on wounds are interesting. Combating the idea that "emotion grows dull" he argues that "it is as though one were to say a wound is assuaged and become calm beneath nitric acid falling drop by drop." The wounds of Marius afforded ample opportunity for descriptive talent: "The doctor examined Marius and, after having determined that the pulse beat, that the sufferer had no wound penetrating his breast, and that the blood at the corners of his mouth came from the nasal cavities, he had him laid flat upon the bed, without a pillow, his head on a level with his body, and even a little lower, with his chest bare, in order to facilitate respiration. . . . The head . . . was covered with hacks; what would be the result of these wounds on the head? Did they stop at the scalp? Did they affect the skull?" Does not the following observation show marked discrimination? "He had for several weeks a fever, accompanied with delirium, and serious cerebral symptoms resulting rather from the concussion produced by the wounds in the head than from the wounds themselves." And this also: "The suppuration of large wounds always being liable to re-absorption and consequently to kill the patient under certain atmospheric influences." Further, "the dressings were complicated and difficult, the fastening of cloths and bandages with sparadrap not being invented at that period" . . . "they used for lint a sheet 'as big as a ceiling'" . . . and "it was not without difficulty that the chloruretted lotions and the nitrate of silver brought the gangrene to an end." The convalescence was delayed "on account of the accident

resulting from the fracture of the shoulder blade. There is always a last wound like this which will not close, and which prolongs the dressings, to the great disgust of the patient." Can it be doubted that the author of these lines, only a part of which I have transcribed, had himself seen and attended such wounds? Even the King had pretensions, for we are told that he was "something of a doctor; he bled a postilion who fell from his horse; Louis Phillipe no more went without his lancet than Henry III without his poniard."

Of wounds in special regions we note an instance here and there. "There was a wound in the shoulder blade . . . but as the lungs were not touched she might recover." "Wounds in the breast demand silence." Surgical diseases are the particular care of Ursus, who thus addresses the populace: "I think and I dress wounds. Chirurgus sum. . . . Almost all our local inflammations and sufferings are issues and, if well cared for, rid us gently of other ills which are worse. Nevertheless I would not counsel you to have an anthrax, otherwise called a carbuncle. 'Tis a stupid malady which serves no end. One dies of it and that is all." He also gives a much needed caution: "An awkward movement, a fright, and there you have a rupture of aneurysm. I have seen instances of it." Arterial ligation was evidently much in Hugo's mind. Over and over again he indulges his imagination in this sort of figure. For example: "It was time that the artery should be bound up. He had suffered a loss of virtue . . . and he felt something like a generous transfusion in his veins." A geographical reference is inspiring: "French blood is largely mixed with Spanish blood. . . . The Pyrenees are simply a ligature efficacious only for a time." History furnished this: "Revolutions such as the revolution of July are arteries cut; a prompt ligature is necessary." Other affections appeal to the figurative nature within him: "The bulging of the

canvas became larger. It grew more and more distorted like a frightful abscess ready to burst." The diagnosis in the following case is not plain, but the plan of treatment admits of no uncertainty: "One day . . . a man was dying, choked by a tumor in his throat, a horrible fetid abscess, possibly contagious and which had to be emptied at once. . . . [The priest] applied his mouth to the tumor, sucked it, spitting out as his mouth filled, emptied the abscess and saved the man's life." Physical disability has always furnished a plea for clemency in crime. "The old punishment," writes Hugo, "which our ancient laws of torture called 'extension' and which Cartouche escaped because of a hernia, this Prometheus undergoes." The question is how did Hugo find that Cartouche had a hernia.

Nor does our observant genius overlook the question of *anæsthesia*. Referring to the time of Queen Anne he recalls "that even at that day the means of putting a patient to sleep and of suppressing pain was known. Only at that epoch it was called magic. Nowadays it is called *anæsthesia*." He speaks at another place of "a stupefying powder . . . which suppressed pain," and, whether accurately or not, thus relates its history: "This powder has always been known in China and it is still employed there at the present day. China had all our inventions before us, printing, artillery, aerostation, chloroform. Only the discovery which in Europe immediately acquires life and growth, and becomes a prodigy and a marvel, remains an embryo in China, and is there preserved in a dead condition. China is a jar of *foetus*."

Victor Hugo was certainly not ahead of his times in *sanitary science*. What would our trained public health officers think of his ideas on the following question? He says "that strong mental excitement is a preservative against all ailments. In times of pestilence, while sanitary and hygienic measures should not be neglected, the people

should be entertained by grand fêtes, grand performances, noble impressions. If no one troubled about the epidemic it would disappear." At least he knew the value of the nurse and paid her this tribute: "It is the physician who prescribes, it is the nurse who saves."

Humor at the expense of the doctor is found in spots. It is not biting. "A funeral is passing. There is a doctor in the procession. 'Hullo!' shouts a gamin, 'how long is it since the doctors began to take home their work?'" And the physician to Louis XI is spoken of as "the brave man [who] had no other farm than the King's bad health. He speculated on it to the best of his ability." After obtaining from his Majesty in one day an appointment for his nephew and a new roof for his house, the doctor had applied to the royal loins "the great defensive cerate composed of Armenian bole, white of egg, oil, and vinegar" and retired followed by the raillery of the attendants: "'tis easy to see that the King is ill today; he giveth all to the leech." Louis' retort to the barber closed the scene: "The physician has more credit than you. 'Tis very simple; he has taken hold upon us by the whole body, and you hold us only by the chin." Below the rank of royalty a bit of dialogue between notables may bring a smile: "Good morning, Marat," said Chabot. "You rarely attend our meetings." "My doctor has ordered me baths," answered Marat. "One should beware of baths," returned Chabot, "Seneca died in one." The following reference includes the social problem along with its grim humor: "If he is rich, let him have a doctor. If he is not rich, let him not have any. If he doesn't have a doctor, he will die. And if he does have one, he will die."

Hugo was hard on the *quack*. He knew the brand instantly. Of Gilliatt he relates: "Peasants came with fear and trembling, to tell him about their maladies. This fear begets confidence; and in the country the more the physician is suspected of magical

powers, the more efficacious the remedy. Gilliatt had prescriptions of his own, which he had inherited from the old dead woman; he bestowed them upon those who asked and would take no pay. He cured whitlow by the application of herbs, the liquor from one of his phials cut short the course of a fever; the chemist . . . thought that it was probably a decoction of cinchona. . . . Gilliatt was a very good fellow for sick people where his ordinary remedies were concerned. . . . He absolutely refused to perform miracles, which was ridiculous in a sorcerer. Do not be a sorcerer; but if you are one fulfill your profession." Do we not now meet those of this kind? And is it not all true to our own life and times—except the "no pay" feature? Ursus, the man, represents the peripatetic patent medicine vendor in all his glory, and, without doubt is one of the cleverest and queerest characters in fiction. "Regarded as a good mountebank and a good physician" he was everything else that it was necessary to be. He describes himself: "I am neither an Englishman nor a man, having the honor to be a doctor. That goes together. Gentlemen, I teach. What? Two sorts of things; those which I know and those which I do not know. I sell drugs and I give away ideas." That stamps Ursus as an out-and-out quack. The real physician sells his ideas, and may or may not give away his drugs. Being a quack he proceeds to denounce other quacks: "Gentlemen," says he, "distrust false savants who speculate upon the briony root and white adders, and who make eye salves from honey and cock's blood. Learn to see clearly through his lies. . . . It is not true that Adam had a navel. . . . Oh, gentle friends who listen to me, if any one tells you that whoever smells of the herb valerian will have a lizard born in his brain, . . . that a man weighs more dead than alive, that buck's blood dissolves the emerald, . . . that the falling sickness is cured by means of a

worm which is found in the brain of a kid, believe it not; these are errors. But here are truths: The skin of a sea-calf is preservative against lightning; the toad is nourished upon earth, which makes a stone grow in his head; . . . the elephant has no joints and is forced to sleep standing erect against a tree; make a toad hatch a cock's egg, and you will have a scorpion which will make you a salamander; a blind man recovers sight by placing one hand on the left of the altar and the other on his eyes. . . . Good people, feed yourselves on these evidences."

Hugo's interest in *deformities* is shown by his creation of these two freaks in human shape—Gywnplaine and Quasimodo. No other writer in our knowledge has succeeded in producing such hideous and repulsive deformities—the one artificial, the other natural. Much has been brought against Hugo for giving these characters sentiment, one critic going so far as to say that he has made "fatherhood sanctifying physical deformity; motherhood sanctifying moral deformity." Marzials says of the "Laughing Man": "To me it is simply a preposterous, an impossible book." Assuredly it is a weird conception. But the details are admirably worked out. Very briefly the method of producing the deformity of Gywnplaine may be stated by Hugo himself: "This artificial production of teratological cases had its rules. It was a complete science. Let the reader imagine orthopedy reversed. Where God had placed a glance, they put strabismus. Where God had placed harmony, they put deformity. . . . It seemed evident that a mysterious science, probably occult, which was to surgery what alchemy was to chemistry, had chiselled that flesh, assuredly at a very early age, and deliberately created this visage. This science, skilful in cuttings, obtusions and ligatures, had split that mouth, opened those lips,

bared the gums, distended the ears, removed the partitions of the cartilages, disarranged the eyebrows and the cheeks, enlarged the muscles of the cheek bones, softened down the seams and scars, brought the skin back over the wounds, still maintaining the face in the gaping state, and from that powerful and profound sculpture, that mask, Gywnplaine, had emerged." A full, if not clear, exposition of the principles of plastic surgery!

Quasimodo I do not attempt to explain. He might be dismissed, according to one reviewer, as follows: "An animal with a turn for bell-ringing and, apart from his deformity and deafness, not entitled to much sympathy." But whatever the classification of his misshape, it was congenital, not acquired. My feeling is that Hugo must have received the impression of this monster through a bad dream. At any rate he put down no figure of speech in which Quasimodo is involved.

Hugo has been accused of being theatrical, of straining after effect. Perhaps so, but he got the effect. Poet, dramatist, novelist, publicist; he stood apart—the great Frenchman. His espousal of the Republic and the Revolution was his absorbing passion. He came down and remained close to the people—a circumstance that caused him to study them deeply, to live with them intimately. This naturally may have directed him to those homely medical illustrations, of which he was so full. Coppée's estimate is not wide of the mark: "Among all the poets of mankind Victor Hugo is the one who has invented the greatest number of similes, and those the best carried out, the most striking, the most significant." What need to tell his life story? Study the man in his writings—there he reveals himself. A characteristic piece of his imagery may form a fitting close to our study: "An idea is a balm; a word may be a dressing for wounds; poetry is a physician."



EDITORIALS

Franciscus Dela Boë Sylvius was a physician whose character and career have an unusual interest. He was a famous and original teacher; and while holding a chair in medicine, he was an industrious student of chemistry and anatomy, particularly that of the brain. In this latter line of work, his descriptions were so vivid and accurate that his name became identified with four different portions of the nervous system.

Sylvius was a handsome man and has left us an unusually fine engraving of himself, done by C. van Dalen. This is one reason, perhaps, why we celebrate his memory here.

Of recent years we have been made familiar with his work through an article by Prof. Frank Baker in the Johns Hopkins Bulletin of November 1909, and one by Dr. Smith Ely Jelliffe in The Charaka Club Book, Vol. III.

Sylvius was born in 1614 of French parents in Hanau, Germany. He studied in several universities, took his medical degree in Basle, Switzerland, went to Paris for a time, settled in practice in Amsterdam, till he was called to be Professor of Medicine in the University of Leyden in 1658, when he was 44 years old. He made a definite success there as a lecturer, teacher, investigator, and practitioner. Here he first instituted bedside instruction.

Sylvius had admirable powers of description with a gift to see things correctly and to individualize what he saw. He had, one might say, a synthetic and ~~epitomic~~ mind.

He saw the fissure of Sylvius as an anatomical entity and described it so definitely that it received his name. He called the *iter tertio ad quartam ventriculam* an aqueduct, and it became the aqueduct of Sylvius. He discovered or rediscovered the fifth ventricle, sometimes called the ventricle of Sylvius. Naturally, the artery of the Sylvian fissure became the Sylvian artery. So, through his power of perceiving acutely, describing clearly, and emphasizing his units, the name of Sylvius dominates all others in cerebral nomenclature. Herophilus, Galen, Varolius, Viessens, and Rolando have each one part, but Sylvius has four. By his happy art, Sylvius has made himself anatomically immortal; though he was not a great discoverer or a man of the very highest type, but an able "runner-up" of greatness. Indeed, Prof. Frank Baker asserts that he was one of the great original thinkers of the seventeenth century.

He was interested in chemistry and physiology, and he had a chemical theory of vital action and disease, but it had no more merit than other theories of those and later days. However, he was a masterly clinical teacher and his greatest real achievements were along this line.

Sylvius was a man of handsome presence, fine personal qualities; benevolent, sincere, and kindly; making and retaining friendships. He was a serious-minded person and seemed rather to court than shun contemplation upon death. Before he was fifty



FRANCISCUS DELEBOE SYLVIVS. MEDICINÆ
PRACTICÆ IN ACADEMIA LUGDUNO-BATAVA PROFESSOR

C. 1720. D. de la Haye Delinavit et Sculpit

years old, he prepared a sepulchre for himself in the choir of St. Peter's Church at Leyden, and had a very modest inscription placed on it.

FRANCISCUS DELEBOE SYLVIVS
 MEDICINÆ PRÆTICÆ PROFESSOR,
 TAM HUMANÆ FRAGILITATIS
 QUAM OBREPENTIS PLERISQUE MORTIS
 MEMOR,
 DE COMPARANDO TRANQUILLO INSTANTI
 CADAVERI
 SEPULCHRO
 AC DE CONSTITUENDA RUENTI CORPORE
 DOMO
 ÆQUE COGITABAT SERIO.
 LUGDUNI BATAVORUM
 MDCXLV
 Franciscus de le Boë Sylvius,
 Professor of the Practice of Medicine,

and of the often stealthy approach of death, bethought him to prepare against that time a quiet sepulchre for his remains, a house for his mortal body.

At Leyden,
 1665.

It would be interesting to know what ~~de~~ ^{distinct} ~~struction~~ Sylvius had in mind when he prepared this "sepulchrum" for his "instans cadaver" and a "domus" for his "ruens corpus." I should guess that he believed the house was to hold the body for the resurrection.

When taken ill with a fever in 1672, Sylvius said to a friend: "I know the gravity of this disease. I escaped three years ago; this time I shall die." His prediction proved true. His death occurred November 14, 1672.

ERRATA

Page 422. First column, last line, EPITOMIC should read EPONYMIC.

Page 423. Second column, seventh line, DESTRUCTION should read DISTINCTION.

Page 424. Second article, first column, sixth line, 1501 should read 1561.

presence of an aberrant cusp which occurs often on the upper molars is perhaps not so well known, but, according to Jeanselmé,¹ treatment for congenital syphilis has often been made on the basis of such a diagnosis. Jeanselmé points out that, since this cusp is present in molar teeth of man from the neolithic, paleolithic and later periods, there is no basis for using such a condition in the diagnosis of congenital syphilis. The case is of even wider import than Jeanselmé suggests.

¹ E. Jeanselmé: "De l'existence du tubercle de Carabelli aux époques paléolithique et néolithique, dans l'antiquité classique et au moyen âge." *Bull. et mém. Soc. méd. de bôp. de Par.*, 24 Janvier, 1918, pp. 51-52.

at any one of three places along the lingual margin of the molar, there has often been confusion in the proper identification of the tubercle of Carabelli. The fact that this cusp occurs more frequently in children than in adults and in primitive races more frequently than in civilized races is of great importance.

This tubercle is often seen in neolithic and in paleolithic man. Gorjanović-Kramberger² says that it occurs in nearly all of

² George C. Carabelli: "Systematisches Handbuch der Zahnheilkunde," 1842, Bd. II, Anatomie des Mundes, p. 107.

³ Gorjanović-Kramberger: "Die Kronen und Wurzeln der Mahl Zähne des Homo primigenius und ihre genetische Bedeutung." *Anat Anz.*, 1907, Bd. 31. pp. 118-120, Fig. 13.

the first and second upper molars of the fossil human skeletons from Krapina, which represent a race of men who lived about 75,000 years ago. He has given an excellent photograph of the tubercle of Carabelli on the molar of a fossil man, and, for comparison, similar cusps on the molars of a native of Java are shown. Batujeff⁴ has shown that the presence of this cusp in the primitive races of man and many genera of apes is of wide distribution. I do not doubt that a careful study of the upper molars of fossil primates would reveal the presence of similar cusps.

This cusp arises from the cingulum near the hypocone and may be regarded as of phylogenetic significance. Gorjanović-Kramberger says: "Den Carabellischen Höcker kann man als ein in Entwicklung begriffenes Gebilde, welches beim rezenten Menschen bereits in höheren Masse ausge-

bildet ist, als phyletisch wichtig bezeichnen und füglich für ein den *Homo primigenius* mit dem *H. sapiens* verbindendes Merkmal ansehen." Adloff and others have taken exception to this view. The entire subject of the evolution of the primates, of which the question of the tubercle of Carabelli is a part, has been recently reviewed by Gregory.⁵

Since the tubercle of Carabelli has such an ancient history, being demonstrable many, many thousands of years prior to the knowledge of the presence of syphilis, it is difficult to see that the two have anything to do with each other. The presence of this tubercle may be regarded as the persistence of an ancient character, and, while it is often said to be hereditary, it seems improbable that it has any connection whatever with congenital syphilis.

ROY L. MOODIE

THE ANATOMIE UNIVERSELLE OF AMBROISE PARÉ

The early works of the Father of French Surgery were in the vernacular, and so popular that, like school books, they were "thumbed" away, and few copies remain. Among the rarest is the "Anatomie Universelle" of 1561, of which Malgaigne knew of only two copies—one imperfect in the St. Geneviève Library and the other at Bar-le-duc in private hands. The St. Geneviève Library is the fortunate possessor of six of the nine works which preceded the great surgery of 1575; but the *Anatomie* is not at Washington, nor in the British Museum or Bodley, nor, so far as I can ascertain, in any of the special collections, except the Hunterian at Glasgow. Dr. Hahn writes (1918) that it is not in the Biblio-

thèque Nationale or in the library of the *École de Médecine*.

Not long ago in a Paris catalogue, a copy was advertised, and after a hurried look at Malgaigne and the Index Catalogue of the St. Geneviève Library, I sent a telegram and was delighted to get the book within forty-eight hours. The provenance is uncertain. It had come in with a number of unbound volumes and was sent to Chambolle-Duru, in whose famous morocco and unmatched gilding it is now adorned—a small octavo of 277 pages. The work must have been a boon to the surgical students of St. Côrne, very few of whom, like Paré himself, had had a classical training. Both editions of the great "Fabrica" had been published, and the text and plates, particularly the latter, are largely Vesalian.

⁴ N. Batujeff: "Carabelli's Höckerchen und andere unbeständige Höcker der oberen Mahlzähne bei dem Menschen und Affen." *Bull. Acad. imp. des Sc., St. Petersburg*, T. 5, 1896 No. 1, pp. 93-109.

⁵ W. K. Gregory: "Studies on the Evolution of the Primates." *Bull. Amer. Mus. Nat'l Hist.*, 1916, vol. xxxv, pp. 239-355.

The gem of the book is a copper engraving, the earliest known portrait of Paré at the age of forty-five, a wood-cut of which,

pression is unusually clear, much more so than the copies from "La méthode curative" and the "Dix livres. . ." just referred to.



an oval medallion, appeared a few months later in "La méthode curative des playes, etc." Both bear the legend *Labor improbus omnia vincit*; in the latter work, encircling the picture, not at the base. It was reproduced in the "Dix livres de la Chirurgie," 1564, with the figure 5 changed to 8. It is by far the most pleasing picture, and I have not found in the Hope and other collections available a reproduction. The im-

ANAT IE
VNIVERSELLE DV

Corps humain, compoſee par A. Paré
Chirurgien ordinaire du Roy, & Juré à
Paris : reueuë & augmentee par ledit au-
theur avec I. Roſtaing du Bignoſc Pro-
uençal auſſi Chirurgien Juré à Paris.



A PARIS.

De l'Imprimerie de Iehan le Royer, Imprimeur du Roy és
Mathematiques; demourant en la rue S. Iaqués, à
l'enſeigne du Vray Potier, pres les Mathurins.

AVEC PRIVILEGE DV ROY.

1563.

The great surgeon is here seen in his prime, and one may read in the face "The gentle masterly and true man" (Albutt).

The fitness of things demands that this copy should return ultimately to France, to the great collection of the École de Médecine.

WILLIAM OSLER.



HISTORICAL NOTES

EARLY INSTRUCTION IN BACTERIOLOGY IN THE UNITED STATES.—Following the publication by Pasteur of the results of his investigations on the relations of the bacteria to fermentation and to disease, several scientists in this country took up, independently, the study of bacteria by Pasteur's methods. These men were interested in the bacteria from either the broad biological standpoint or from the standpoint of pathology.

Probably the first name in the list of early teachers is that of the late Dr. T. J. Burrill who introduced the study of the bacteria into his course on the fungi, during the "seventies." He discovered the organism of pear blight in 1879, and in the following years conducted extensive inoculation experiments with this organism on a large orchard of young pear trees, thereby definitely establishing the etiological relation of the organism to the disease.

The late Surgeon General George M. Sternberg, whose investigations on the causation of yellow fever, malaria, syphilis and other diseases are well known, also discovered the pneumococcus in normal sputum, and laid the foundations for our knowledge of the value of a large number of chemical substances as disinfectants.

Dr. William H. Welch from 1878 on was interested in the bacteria and their relation to disease. On returning from Europe in 1885 Dr. Welch became the head of the Pathological Institute at Johns Hopkins University, and had for his assistant in the instruction in bacteriology Dr. A. C. Abbott, who had been Dr. Sternberg's assistant in

the Biological Laboratory the previous year. Later on Dr. George H. F. Nuttall also became his assistant, and was associated with Dr. Welch in the discovery and study of the "gas" bacillus.

Dr. T. Mitchel Prudden at the College of Physicians and Surgeons in New York also taught the staining of bacteria in sections of tissues and in sputum, to his students in pathology, and commenced the cultivation of bacteria on solid media about 1883. Dr. Prudden, aside from his interest in the pathological action of bacteria, also very early interested himself in the relation of bacteria to air, water, and ice, which were subjected to critical study, the results forming the basis of valuable monographs.

Beginning about 1879, Dr. D. E. Salmon commenced his important studies on the relation of bacteria to animal diseases in the Bureau of Animal Industry at Washington, and while Dr. Salmon is not known generally as a teacher of bacteriology, there is every evidence that he was the instructor of assistants in the Bureau and was the leading inspiration for many of the early discoveries made by the Bureau staff; notably the epoch-making work which he did in association with Dr. Theobald Smith on Texas cattle fever, work which in a broad sense can be included here, even though the organism responsible for the disease is not a bacterium, but a protozoon.

In addition to those early teachers the following also deserve special mention: Dr. Henry Formad, at the University of Pennsylvania; Dr. W. T. Councilman, known particularly as a pathologist; Dr.

Herman M. Biggs, in charge of the Carnegie Laboratory when that was attached to the Bellevue Hospital Medical College; Dr. E. A. Birge, who inspired some of our noted biologists who studied under him; Dr. C. T. Cheesman, who began the first systematic instruction in bacteriological technique; Dr. John E. Weeks, at the Ophthalmic and Aural Institute; Dr. Harold, at the Harvard Medical School in 1885; Dr. Theobald Smith; Dr. L. H. Pammel, in the veterinary school at the Iowa State College of Agriculture; Dr. Bayard Holmes, at the Chicago Medical College in 1888 and later at the Post Graduate Medical School at Chicago and at the College of Physicians and Surgeons; Dr. Victor C. Vaughn and Dr. F. G. Novy, at the University of Michigan in 1889; Dr. H. W. Conn, who has directed his interest principally to the activities of the bacteria of milk and soil in their bearing on agriculture; Dr. W. T. Sedgwick, at the Massachusetts Institute of Technology in 1888-1889; Dr. Joseph MacFarland, at the Medical School of the University of Pennsylvania in 1892 and following years; and Dr. William H. Park, at Bellevue Hospital Medical College in 1895.

From these simple beginnings the teaching of bacteriology has come in a comparatively brief time to play a very important part in the scientific education of many persons, and bacteriology is to-day being taught in a large number of educational institutions in this country. Courses are given, not only in elementary bacteriology to general science students but to students in domestic science, agriculture, dairying, water and sewage purification, public hygiene and sanitation, medicine, dentistry, veterinary medicine, pharmacy, brewing and fermentation industries, food production and preservation and plant pathology.

DAVID H. BERGEY,
Major M. R. C., U. S. Army,
University of Pennsylvania

THE EVOLUTION OF DERMATOLOGY—The impulse to specialization during the last quarter of the nineteenth century grew so strong that the intercommunicating bonds among the various fields of medicine became obscured. Dermatology suffered with the rest. The apostles of the newer creed worshipped most devoutly in Vienna at the shrine of Hebra. A scientific priesthood evolved, speaking a language incomprehensible to other physicians, and often vague enough to the anointed. A technical vulgate flourished at the expense of scientific dermatology. Thereupon, the latter entered its dark ages, but the renaissance is at hand.

It was the thundering of the Southern Teutonic school that effected the division between dermatology and general medicine. In France and England, although unnoticed in the general din, the influence of Willan and of his disciples still sustained the substantial principle that the anatomical envelope of the human body was an integral physiological part thereof, and not a vestment that could be taken off, mended, laundered, and replaced. In northern Germany Unna and his pupils opposed the Viennese orthodoxy by attempting to bring the study of cutaneous maladies in line with Virchow's ideas of cell pathology. Thus, the Hamburg faction, upon a basis of microscopy and microchemistry, made a definite contribution to dermatology as a biological science rather than a dialect. In the late eighties America was invaded by alien votaries of all cults, and Americans themselves returned from abroad, having studied at the various centers, some having studied at all of them. Thus, without bias, American dermatologists founded an eclectic school upon the best that Europe could offer.

Europe is now understanding that America is to be regarded seriously. So far as Americans are concerned, Europe has ceased to be Mecca in dermatology, and such pil-

grimaces as they may deign to make in the future will not be with the idea of obeisance, but with the full knowledge that they will bring abroad at least as much as they receive. In general, European medical opportunities excel ours, because the clinical material is concentrated, and is more readily employed for investigation. This stimulated medical research in the old world earlier than here, but now we are fast closing the gap. Considering Europe's research advantages, and this holds particularly true in Germanic countries, there has been virtually no creative dermatology abroad. In our country, on the other hand, and against the utmost opposition and with the scantiest of equipment, very earnest original work has been attempted. That it has not yet led to anything definite is due almost entirely

to the newness of the work, and the fact that we must embark timidly upon uncharted seas. In Teuton Europe dermatologists are still classifying, labelling and making histological studies in order to create an illusion of science. In America a small but ever increasing group of men is studying metabolism, the endocrinous glands, anaphylaxis, and clinical medicine in relation to skin diseases. It is the object of this exposition to set forth the little that has been accomplished, but that little is the result of scarcely ten years of effort and a generation of dermatological independence. This seems most encouraging to those of us who do not believe that the royal road to dermatology is *Alserstrasse*.

WALTER JAMES HEIMANN, M. D.
New York City

THE CHARMS OF PRECEDENCE

Such is my theme, which means to prove,
That though we drink, or game, or love,
As that or this is most in fashion
Precedence is our ruling passion.

When college-students take degrees,
And pay the beadle's endless fees,
What moves that scientific body,
But the first cutting at a gaudy?
And whence such shoals, in bare conditions
That starve and languish as physicians,
Content to trudge the streets, and stare at
The fat apothecary's chariot?
But that, in Charlotte's chamber—see
Moliere's Médecin malgré lui—
The leech, howe'er his fortunes vary,
Still walks before the apothecary.

William Shenstone (1714-1763).



BOOK REVIEWS

STUDIES IN THE HISTORY AND METHOD OF SCIENCE. Edited by Charles Singer, Oxford, at the Clarendon Press, 1917. 40, 304 pp., 41 plates, 23 illustrations.

This impressive and beautifully illustrated book opens with an introduction by Sir William Osler, who presents a lucid and interesting explanation of the object of the work. This is to contribute to the story of how human knowledge was gained, and how scientific methods were evolved and their results systematized. (We just venture to say *passim* that we do not believe Sir William could construe his first sentence.)

The volume is made up of a series of historical and critical studies, which are richly illustrated and which, for the most part, represent the results of original investigations. It is not at first apparent why the title "Studies in the History and Method of Science" should be given to such a collection, for most of the articles deal with persons who did not follow scientific method as we know it to-day. We infer, however, that the subjects dealt with represent various historical examples in which knowledge was sought for by means of rational observation, rather than accepted as from inspiration or tradition.

The Editor opens with a very elaborate, original and beautifully illustrated article on the scientific views and interpretative visions of St. Hildegarde. The author has used the Saint and her activities as a medium for describing the condition of natural knowledge at the period in which she lived, 1098-1180. He depicts Hildegarde's schemes of the Universe, her allegorical conception of "The Soul pervaded by the Godhead," and again of this God-pervaded Soul "embracing the macrocosm and mi-

crocosm." There are wonderful reproductions in color showing "The Celestial influences on men, animals and plants"; "The Fate of the elements at the last judgment," "The relationships of human and cosmic phenomena," "The birth of the soul, its trials and departure after death." There is also an impressive colored illustration of "The Fall of the Angels" which is suggestive of William Blake, or whatever form of most modern art it is that aims to tell a story by means of weird symbolisms. It is better than the Picassoes, and Matisse's, and Cézanne's of New York shops. In fine we are shown that in the dark days of the good Saint, there were definite attempts made, out of the scriptures, and legends and visions and some serious thinking, to explain the plan of the universe and man's relation to it and his Maker.

Dr. J. W. Jenkenson has a well-written essay on "Vitalism" in which he does not believe. He touches only briefly on the newer physiological interpretation of vital phenomena; hence his argument and article do not seem complete or convincing.

Dr. Singer contributes a study in "Early Renaissance Anatomy with a new Text: The *Anothomia* of Hieronymo Manfredi (1490)." It contains much original and interesting material with many illustrations. Manfredi (1430-1493) was Professor of Medicine in Bologna and wrote a good many treatises on astrology and medicine. A manuscript copy of a short treatise on anatomy is in the Bodleian Library. This is reprinted and parts of it are translated in the present article. Dr. Singer states that Manfredi's *Anatomy* is more complete than that of Saliceto or that of Mondino.

"The Blessing of Cramp-rings—a chap-

ter in the History of the Treatment of Epilepsy," by Raymond Crawford is an interesting and well-illustrated story of the blessing of rings for the cure of epilepsy by the kings and queens of England.

The article on Dr. John Weyer and the Witch Mania by Dr. E. T. Wellington is a careful historical study of this abnormal phase of human deviation. Witches and witchcraft form a curious phase of life among savages and early civilizations. Probably witchcraft added somewhat to the picturesque and dramatic side of savage and semi-civilized life. In early mediæval times witchcraft was a harmless and unimportant factor, but in the fifteenth and sixteenth centuries Europe became obsessed with fear of witches and a zeal to destroy them. It seems incredible to us now that in those years so many persons should have been tortured and burned as this account avers. The real number is not even approximately known. It ranged from 40,000 to over a million, and we are told that the mania for burning supposed witches caused more deaths than the wars or pestilence of those two centuries. The author might have lightened his article by inserting some of the old cuts which filled Reynard's book on this same subject—published twenty odd years ago. Reynard took the matter less seriously and more journalistically. As we read Dr. Wellington's article and its descriptions of epidemic fear, we realize that even civilized countries to-day often get touches of this same outrageous obsession. More often, now the fear is of some disease like tuberculosis or influenza, or in wartime, of enemy spies.

We have not space specially to discuss Dr. Levy's brief but learned article, "*Tractatus de Causis et Indiciis Morborum*." He shows that the tractate was not written by Maimonides.

F. C. S. Schitler's contribution, "Scientific Discovery and Logical Proof," is devoted to showing the limitations of formal

logic. Many years ago Macaulay in an Essay on Mill's Theory of Government, attacked the validity of logic in a less elaborated but more winsome way than does Dr. Schitler, but Dr. Schitler pursues the method of science, and he is more convincing if less readable than Macaulay.

CHARLES L. DANA

THE OLD PHYSIOLOGY IN ENGLISH LITERATURE.
By P. Ansell Robin, D. Litt. A thesis submitted to the University of London for the degree, Doctor of Literature. J. M. Dent & Sons, Ltd., London, and E. P. Dutton & Co., New York, 1911. 8vo, cloth, 183 pages. \$3.00.

This essay is delightful reading for those conversant with the older physiology. It recalls the four elements of Empedocles (470 B.C.)—air, earth, fire and water, each of which was compounded with two of the properties, hot, cold, wet or dry. Galen (A.D. 200) in *Medical Definitions* says: "The elements of medicine, as some of the ancients thought, are hot and cold, moist and dry," and also "Of what are our passive bodies composed? Of four things, blood, phlegm, bile and melancholy humour, which some also call passive elements. Or (putting the question in another way) of what do our material bodies consist? Of the four elements, fire, air, earth and water."

Chaucer's doctor, from this ancient information, knew the causes of diseases:

"He knew the cause of every malady,
Were it of cold or hot or moist or dry
And where engendered and of what humour,
He was a very perfect practisour."

And this tradition persisted despite the warning of Hippocrates, the Father of Medicine (c. B.C. 430), "Whoever having undertaken to speak or write on medicine have first laid down for themselves some hypothesis to their argument such as hot or cold or moist or dry or whatever else they choose (thus reducing their subject within a narrow compass and supposing

only one or two original causes of disease or of death among mankind) are clearly mistaken in much that they say."

Molière satirizes physicians who are his contemporaries as follows:

"*First doctor*: 'Do you eat well, sir?'

"*Pourceaugnac*: 'Yes and drink still better.'

"*First Doctor*: 'So much the worse! This great craving for cold and moist is an indication of heat and dryness within.'"

Phlegm is described by Galen as "cold and moist, applied by nature to the swallowing of food and the movements of the limbs." Phlegm included saliva, mucus of the respiratory tract and the synovial fluid. Thus Pope speaks of the stomach after excessive eating as:

"A tomb of boiled and roast, and flesh and
fish,
Where bile and wind and phlegm and acid
jar
And all the man is one intestine war."

In the fourteenth century medical students at the University of Cambridge still attended two full courses of lectures on Galen's "Commentaries on Hippocrates." The author believes that the Galenic physiology was currently known among educated people of the sixteenth century. He states "In the case of Shakespeare, however, the number and accuracy of his illusions warrant the belief that he had made acquaintance with medical writings at first hand." He does not believe that Shakespeare anticipated Harvey's discovery in 1620, of which Dryden speaks:

"The circling streams, once thought but
pools of blood,
(Whether life's fuel or the body's food)
From dark oblivion Harvey's name shall
save."

These few selected fragments are taken as illustrative of a scholarly and interesting effort.

GRAHAM LUSK.



CORRESPONDENCE

To the Editor:—

BIBLIOGRAPHICAL NOTES ON PLAGUE TRACTATES.—The article "Plague Tractates" appearing in this issue of the *Annals*, by Dorothea Singer and Reuben Levy has interested me very much as a welcome contribution to a much neglected branch of mediæval Jewish literature. Aside from some publications of medical works of Maimonides by Kroner nothing has been done in this field since the death of Steinschneider, and it is seldom that competent medical students favor us with the edition and interpretation of Hebrew texts. May I be permitted to add a few bibliographical notes which occurred to me when reading the article.

In amplification of *Note 2*, I would mention that of Hebrew tracts on the plague, two are printed. A translation of Valesus de Taranta "de peste" (a part of his *Philonium*), appeared in Constantinople circa 1510 under the title "התחבית", לסילוחו הרב, 9 leaves 4, see Steinschneider "Hebraeische Uebersetzungen", p. 819. (A copy of this extremely rare booklet as well as the MS formerly belonging to Steinschneider may be found in the library of the Jewish Theological Seminary of America, New York.) An original treatise by Isaac ben Todros, written at Avignon after 1373, was published by David de Günzburg from a MS in his possession in the "Jubelschrift zum neunzigsten Geburtstag des Dr. L. Zunz", Berlin, 1884, Hebrew part, pp. 104–26; compare D. Kaufmann in "Goettingische gelehrte Anzeigen", 1885, pp. 451–56, *Histoire littéraire de la France*, XXXI, pp. 699–700. An interesting

passage on the plague in Moses Narboni's medical work "אורה חיים", written in 1350, was published with the omission of the technical medical points by Steinschneider in the Hebrew periodical *הכרמל*, VII, p. 110–11. (See further on this book, of which the same library possesses two MSS representing different versions, in Steinschneider, loc. cit. 746–47; *Histoire littéraire*, loc. cit. 676–78.) The treatise on this subject by Abraham Caslari, which precedes that of John of Burgundy in the Paris MS 1191, reads almost like a translation according to Steinschneider, "Catalogus codicum hebræorum bibliothecæ academice Lugduno Batavæ", Leyden 1858, p. 159.

Concerning the identity of the two MSS which is discussed in *Note 24*, it should be noticed that the beginning of Vienna MS in "Hebraeische Bibliographie" XVII, 57, note 1, shows the identity with Paris MS, 1124, but omits the three puzzling words which are rather arbitrarily interpreted in *Note 36*. The Berliner-Günzburg MS of the other version while literally agreeing with the Paris MS, 1191, as can be seen from the extracts in *Magazin* XII, 183, has a complete ending before the astrological epilogue (fol. 134 verso line 1 of MS 1124) with the variant Montpellier for Liège. The title of the other tract of John on the subject (*deus deorum*) reads here also *אלי אלו*; in consequence the correction in *Note 30* becomes rather doubtful, the translator possibly having chosen this term.

Cod. Hebr. 2 of the Leeuwarden library contains, according to De Goeje, "Catalogus

Cod. Orientalium Bibliothecæ Academiæ Lugduno Batavæ" Vol. V. p. 305, as the last piece a treatise on dietetics by Isaac Israeli! Neubauer, however, when examining the MS found instead three tracts on the plague, see Letterbode II, p. 84. Of these the third by John of Tornamira is written in Spanish with Hebrew characters, the other two are Hebrew; the first is ascribed to a still unidentified Paul of שופיא (Sophia? Steinschneider, "Hebraeische Uebersetzungen", p. 816); the second, which is anonymous, Neubauer thinks might be identical with that of John of Burgundy, Paris MS, 1191. A glance at the first words which he communicates permits us now to definitely deny this identity. The text accordingly requires further investigation.

The articles by Renan-Neubauer in the "Histoire littéraire de la France", XXXI, pp. 723-25 and by Moise Schwab, "Revue des Études Juives", XLI, pp. 154-55, should be noted as giving some data about Benjamin of Carcassone, who is described as translator of MS 1191, (viii).

As to the anonymous translator of MS 1124, Steinschneider's hypothesis that it might be the same Joshua of Bologna who translated another tract on the subject following ours in the Paris and Vienna MSS deserves mention. A linguistic examination of the names of medicaments in the text might show whether the translator was an Italian.

In conclusion a few remarks may be added about the Hebrew texts.

The copyist of MS 1191 frequently divides the words if he lacks the space at the end of a line to finish them, a very uncommon procedure in Hebrew texts. For the convenience of the reader these cases might have been indicated by a hyphen. The practice to fill the empty space at the end of a line by the first one or two letters of the next word is very common. The line on top of these letters is not an abbreviation mark but stands for "deleatur." The same

is the case with the line over הני fol. 141 verso line 18; the copyist began to write הניתי when he noticed that he had omitted a word. All such letters might just as well have been omitted in the edition.—Fol. 141 verso line 26 read עכסים for ערבים; see facsimile.—Fol. 142 recto line 1 perhaps לטור ought to be read for לבוש.

MS 1124 is corrupt in many places. In addition to the corrections proposed by the editors the following may be suggested: Fol. 133 verso line 8 read: אחה רואה בנשיכת; 16 line 22 and 134 recto line 1 read האבר וירילי; fol. 134 recto line 5-6 read הארם אארסי for החומר (comp. line 16 and 134 verso line 13); ib. line 6 for לבנם perhaps לבים (comp. לבית 134 verso line 10) ib. line 25 נרסא seems to be dittography from the following word; fol. 134 verso line 9 for ויתחוק better ויחוק; ib. line 10 for בחוק perhaps לחוק; ib. line 14 read הנספר for הארם; the marginal glose "Infetto" probably refers to הרע; line 15 add נוהר after שתהיה; fol. 135 recto line 9 read טוב There still remain some passages in need of emendation.

ALEXANDER MARX.

TRANSLATION OF GALEN'S ENTIRE WORKS INTO ENGLISH—CATALOGUING SCIENTIFIC MANUSCRIPTS.—The following extract from a letter of Dr. Charles Singer to Dr. Dana should greatly interest students of medical history.

There are two projects that we have in hand which I think would interest you and other American scholars, and to which I should like to call your attention.

1. The first is a scheme for complete translation into English of the entire works of Galen. The Germans are gradually bringing out the Corpus Medicorum Græcorum, which will include Galen in his entirety.

As they come out, volume by volume, we hope to have them rendered into English. With this end in view, we propose to found a Galen Society, in which we hope to include American men.

The services of Dr. Withington are available for the purpose. Dr. Withington, I may say, is an absolutely first class Greek scholar and, for reasons of health, is entirely unavailable for military purposes. I believe the Oxford University Press could be persuaded to publish the translation, and the only burden on the Galen Society would be some recompense to the translator for his time and trouble.

I should be glad to hear what your view, and that of other Americans, may be on the subject, and should you be interested I would let you know of the progress of our scheme.

2. The other undertaking which I would like to mention to you is the Catalogue of Scientific MSS in the libraries of Great Britain and Ireland, which is in process of preparation by Mrs. Singer and by myself, or rather by Mrs. Singer, for she, with several helpers, has been responsible for the whole work in my absence.

It is our hope, when the Catalogue reaches a serviceable stage, which should be by the end of the summer, that it will place the worker who cares to use it in quite as favorable a position for the study of medical and scientific MSS as those of us who are living in touch with the great European libraries.

The Catalogue will include all MS material up to the year 1500. It will be in card form, and will be classified according to the subject, Anatomy, Astronomy, and so forth. It will contain about 40,000 entries.

By its means a worker, in the United States for instance, will be able to see at a glance what MSS there are that are of interest to him, and he could procure roto-graphic or photographic copies of them by communicating with the library where they are to be found.

Yours sincerely,

CHARLES SINGER

CATALOGUE OF MANUSCRIPTS OF SCIENTIFIC INTEREST, UP TO THE YEAR 1500, IN THE BRITISH ISLES. EDITED BY CHARLES AND DOROTHEA SINGER. *On press.*

The Catalogue will be arranged primarily under subjects, and subdivided chronologically, by centuries, and by the localities in which the MSS are found.

There will be a very brief excursus on each text so far as is possible.

There will also be two indices.

INDEX 1.—Alphabetical combined list of: authors; places; scribes; languages (giving subject, collection, MS number and foliation, and catalogue page).

INDEX 2.—Alphabetical list of manuscript collections with the MSS arranged in numerical order, and giving the library¹ in which each collection is preserved, the subject and the catalogue page.

HEADINGS OF THE CATALOGUE

ALCHEMY	HÆMATOSCOPY
Chemistry	Blood-inspection
ANATOMY	HERBARIA
ARISTOTLE (Secretum	HOSPITALS
Secretorum Aris-	HUSBANDRY
totle to Alexander)	LAPIDARIES
ARTS AND CRAFTS	MATHEMATICS (Pure)
ASTROLOGY	MEASURES AND WEIGHTS
Menology	MEDICINE (General)
ASTRONOMY	MELOTHESIA
BESTIARIES	MISCELLANEOUS
Monstrosities	MUSIC
Fables	HARMONY
CALENDAR	(Scientific Aspects)
COMPUTUS	OPHTHALMOLOGY
CHARM	PESTILENCE
Magic	Contagion
CHILDREN	Epidemic
COSMOLOGY	Plague
De Rerum Natura	Infection
De Elementis	PHLEBOTOMY
DIET	Blood-letting
FERMENTATION AND	PHYSICS
GENERATION	PHYSIOGNOMY
FEVERS	Chiromancy
GEOGRAPHY	PHYSIOLOGY (Four
Travel	temperaments, etc.)
GYNÆCOLOGY	PROGNOSTICS

¹ Under Bodleian Library, it will be necessary to print also a list of the MSS in numerical order according to the old numbers (retained in the New Summary Catalogue) giving the present pressmark, i. e., collection and number.

CATALOGUE HEADINGS (CONT.)

PULSES
 RECIPES
 REGIMEN (Other than Secretion)
 SCIENCE (General)
 Encyclopædias of General
 Knowledge. (e. g., Bartholomæus)
 SURGERY
 URINE
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To the Editor:—

A MODERNIST'S VIEW OF MEDIÆVAL SCIENCE—
 I should hate you to misunderstand my attitude towards Mediæval Science. I always feel towards it as Huxley did towards Ghosts. He used to say, you know, that "he didn't believe in ghosts because he had seen too many of them." I don't think there are many mediævalists who feel less mediæval than I do. But the Middle Ages, like the Germans, are there, and we have just got to consider them. The important question is, to my mind, not whether mediæval science made any advance on knowledge, for it clearly did not, but whether the point of view and the intellectual processes which gave rise to the Middle Ages have or have not had a deep and lasting effect. To my mind they have. To my mind modern thought is the descendant of mediæval and not of classical thought. To my mind the classics have never been, and cannot now be studied from the inside by the Western nations. If the men of the Middle Ages were children, then the men of Greece were foreigners. It is, of course, possible to appreciate the beauties and the meaning of the Greek and Roman writers, but to

look at the classics from within and feel with the heart of a Greek, or think with his mind, is a task of excessive difficulty and one seldom accomplished even by the rarest of scholars.

To understand how our science is what it is, we must go back to the point of view of our veritable intellectual ancestors, the men of the Dark Ages, of whom Greece and Rome were not the parents but only the schoolmasters. That is my chief plea for the study of the Middle Ages.

But further, and apart from this, I would urge that the mere fact that in a thousand years no new scientific method was introduced, no progress was made, and that the history of the knowledge of the outside world may be summed up by saying that it was a progressive misunderstanding; that fact, I say, is one of prodigious importance in the history of the human mind. Shall it then be passed over in any history of human thought, medical or other? The intellectual barrenness of the Middle Ages had, like other phenomena, its efficient causes. Those causes are surely worth study. They are specially worth analysis

by an age such as this, when the first intellectual stimulus of scientific discovery has gone by. To avoid the danger of anything in the nature of a scientific hierarchy, it is necessary to analyse the basis of scientific belief and the character and conditions of scientific achievements. The Middle Ages provide the Pathology of Science, the study of which may throw light on the growth of the healthy organism. I agree with what you say, that in medicine it is not till recent times and then comparatively suddenly that science has come by its own, but then the same may be said of science itself as applied to all technical subjects in greater or less degree. To my mind these Middle Ages were the period of gestation of science, and that period has been longer for medicine than for most technical subjects. Therefore I look upon myself as an embryologist of science, and though embryology may be less important than anatomy or pediatrics, it may yet throw light on both. The ovum is utterly different from the adult organism, but it's worth study for all that.

CHARLES SINGER

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A WORD FROM THE PUBLISHER

WITH the completion of Volume one of the *ANNALS OF MEDICAL HISTORY*, the publisher desires to express his appreciation of the coöperation received from members of the profession, whose watch-word is "sacrifice," and who, in these times of stress have added new lustre to their history by maintaining the best health record in the history of the armies of the world.

The fact that the first number of the *Annals* appeared synchronously with the entrance of the United States into the war was due entirely to the hard work and enthusiasm of the Editor, Captain Francis R. Packard. His last efforts before leaving for duty with Base Hospital No. 16 in France were devoted to the preparation of the first number. This appeared after he had entered upon the arduous duties which he is still carrying on at the front. To suggestions that material would not be forthcoming and that subscriptions would lag on account of the war, Dr. Packard lent a deaf ear. The four numbers now published are submitted as a vindication of his judgment.

Lieutenant Colonel Garrison edited the second number. Of his kindly help and suggestions the publisher has had many opportunities to avail himself and too much credit and thanks cannot be given him.

Beginning with the third number, Dr. Charles L. Dana of New York City assumed editorial charge of the *Annals*, pending the return of Dr. Packard. For Dr. Dana's willingness to add to his duties and responsibilities at this time, the publisher extends his thanks and bespeaks those of the subscribers.

To the Associate Editors thanks are due for their helpfulness and encouragement and special mention must be made of Sir William Osler, who has found time not only to write articles, but to procure them from others.

Captain Charles Singer and his wife have rendered assistance that we feel will be appreciated not only by the readers of the *ANNALS OF MEDICAL HISTORY* but by all medical men of both America and England. Their contributions will serve to cement further the bond of friendship in the profession of the two countries.

To all who have unselfishly contributed their papers to the first volume of the *Annals* and made possible its completion, and to those whose subscriptions have given the encouragement necessary for successfully carrying on the *Annals*, the publisher extends his heartiest thanks. The courtesy and patience of subscribers will not be forgotten, for despite delays in publication, they have had nothing but encouraging words for the *Annals*.

With the return of peace, it is hoped that the usefulness of the publication will be demonstrated in such a fashion that the workers whose efforts have been so generously and unostentatiously given will be more than recompensed.

Number 1 of Volume II is already in hand and for its future, the publisher solicits the continuation of that collaboration which has made Volume I possible.

PAUL B. HOEBER,

Publisher.

New York,
November, Ninteen Hundred Eighteen.

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